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The NEW UNIVERSAL ENCYCLOPEDIA

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BIRD - CARAC

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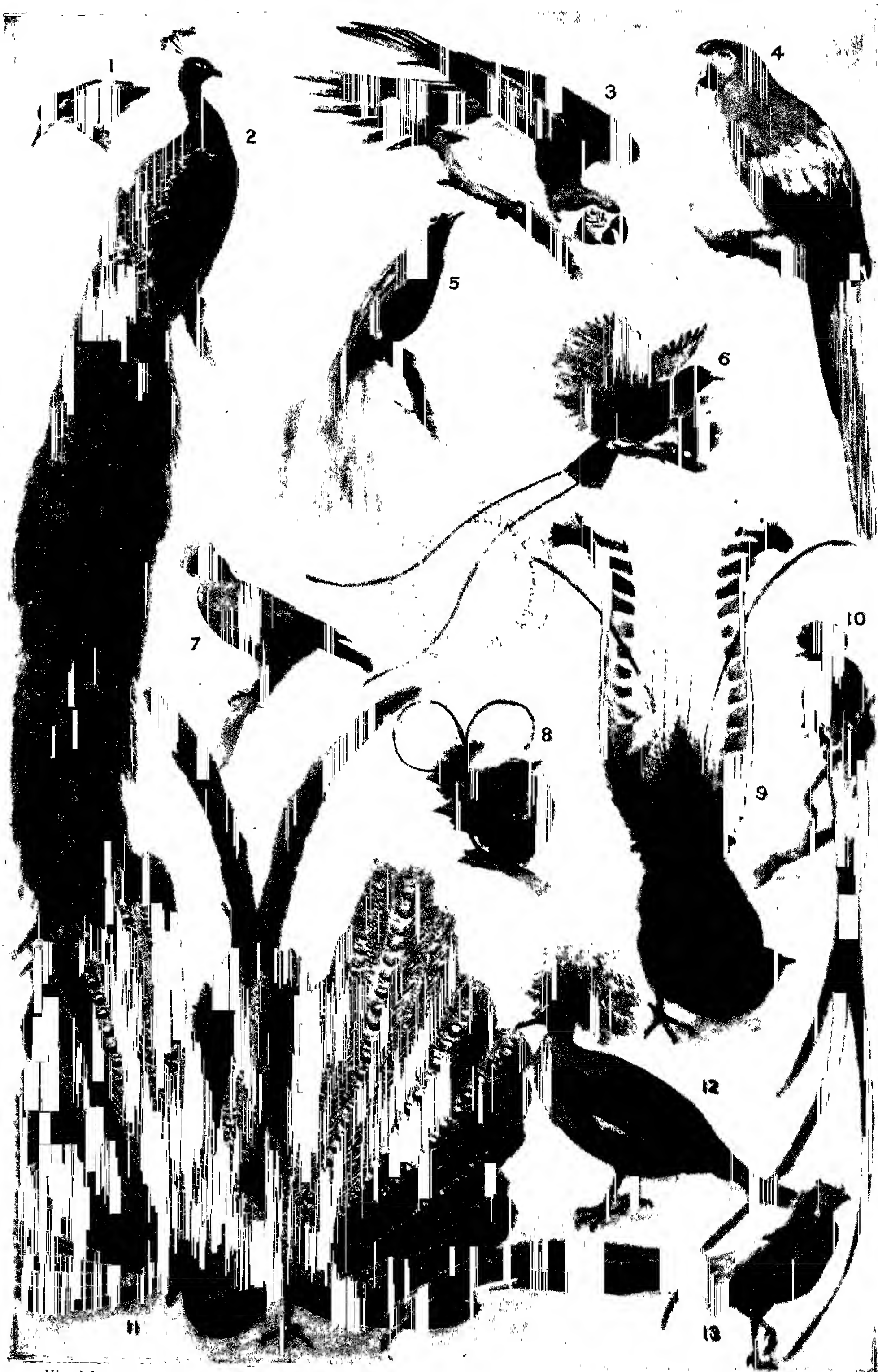
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1. Common house parrow. 2. A greedy starling. 3. Male chaffinch feeding its family. 4. Blue tit, a garden favourite. 5. Robin, the most lovable British bird. 6. Blackbird, a notable song-bird. 7. A young thrush. 8. Heron, one of the largest and most handsome of British birds. 9. Woodpecker at the

entrance to its home. 10. Voracious chicks greet this yellow-hammer on its return. 11. The bittern, whose beautiful markings resemble the reeds in which it makes its home. 12. Kingfisher, a waterside bird. 13. Dipper, an aquatic bird and a good diver. 14. Pied wagtail by its nest in a stream bank.

BIRDS: BRITISH BIRDS OF HOUSE, HEDGE, TREE, AND WATER



1. Kingfisher. 2. Black-shouldered peacock. 3. Blue and yellow macaw. 4. Red and blue macaw. 5. Great bird of paradise. 6. Prince Rudolph's bird of paradise. 7. Colombian cock-of-the-rock. 8. Hunstein's bird of paradise. 9. Lyre bird. 10. Quetzal, from Central America. 11. Argus pheasant. 12. Common crowned pigeon. 13. Golden pheasant.

BIRDS · TRIUMPHS OF COLOUR AND FORM FROM THE ARTIST HAND OF NATURE

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Bird. Class of warm-blooded feathered animals related more closely to reptiles than to any other group of vertebrates. Present-day reptiles are cold-blooded; but it seems probable that from some extinct form of reptile having warm blood the birds (Aves) may have descended.

In almost all birds the fore-limb has become a wing capable of flight, and the heart is four-chambered. Along with mammals, which are also warm-blooded but have a different kind of four-chambered heart, birds are the highest back-boned animals or vertebrates. The two classes are not related except in having a common ancestry among extinct amphibia.

Were it not that man belongs zoologically to the class of mammals, it would be difficult to call mammals a higher class than birds. Mammals are on the whole superior as regards brain development and the structure of the heart, while birds are superior in their breathing arrangements and powers of locomotion. The great majority of mammals have an intimate and more or less prolonged ante-natal connexion between the unborn young and the mother, whereas all birds are oviparous, i.e. they lay eggs which hatch outside the body. Birds are marked off from modern reptiles in having feathers, in having more complex and relatively larger brains, in sending only pure blood from the heart to the body, in having only three digits in the hand and four in the foot, and in being warm-blooded. Some extinct reptiles had well-developed wings, and others were bipeds; some were probably warm-blooded.

Birds that do not Fly

The oldest known bird, *Archaeopteryx*, whose well-preserved remains have been found in Jurassic rocks, had many reptilian features—teeth on both jaws, a long lizard-like tail, and a sort of half-made wing with three clawed digits.

All other birds are often divided into a small section of flightless birds (Ratitae) and an enormously larger section (Carinatae) of flying birds. The flightless birds include the African ostriches (*Struthio*), the South American ostriches (*Rhea*), the Australian emus and cassowaries, the New Zealand kiwi or apteryx, the gigantic extinct moas of New Zealand, and the still larger extinct "roe" or *Aepyornis* of Madagascar.

These species of bird are something of a puzzle, for although they

are alike in being unable to fly many ornithologists think that they are not very nearly related to one another, and do not form a coherent section.

Except in the tinamous, in a burrowing parrot (*Stringops*), in the dodo, and a few others, the breast-bone of Ratitae is raft-like, without the keel or carina for the fixing on of the flight-muscles which distinguishes the Carinatae. The deeper differences between flying and flightless birds are of a technical kind, for instance as regards the structure of the bony palate, or the absence of a "merry-thought" in the breast-girdle and of a "ploughshare bone" at the end of the short tail; but there are interesting superficial differences, e.g. the feathers of the adult ratite birds (not including tinamous) have free barbs which do not unite to form a vane. The loose structure of ostrich plumes is well known.

Orders of Flying Birds

The difficulties of classifying the flying birds, of which there are more than 10,000 species, are very great. One reason for this is the variety of detail within a comparatively narrow range; another is that birds of similar habits and haunts and diets may come to resemble one another superficially, being similarly adapted to the same conditions of life, while they are not in reality like one another in those deeper characters that count in discovering blood relationships. Thus there are some superficial resemblances between swifts and swallows, but no near affinity.

In the same way the petrels are not near the gulls, nor the auks near the divers. The more important orders of flying birds may be somewhat provisionally arranged in groups: (a) penguins, grebes, divers, and petrels; (b) ducks, geese, and swans; (c) storks and herons; (d) birds of prey; (e) pelicans, gannets, and cormorants; (f) game-birds and mound-birds; (g) rails and cranes; (h) pigeons and sand-grouse; (i) gulls, auks, and plovers; (j) cuckoos, parrots, woodpeckers, kingfishers, owls,

swifts, and humming-birds; and (k) the great tribe of perching-birds or Passeres.

Most birds live an intensely active life, as is indicated in their high temperature (sometimes rising to 112° F., 13·5° higher than man's) and in the rapid beating of the heart (sometimes 120 per minute when the bird is at rest and much more when it is flying). The muscles of flight often weigh a sixth, and in the pigeon about a half, of the whole bird; some birds can fly more than a mile a minute.

Flight and Diving

In ordinary flight the wings move forwards, downwards, backwards, and upwards in a complex curve. The downward component of the stroke keeps the bird up; the backward component keeps the bird speeding onwards; the raising of the wing requires relatively little effort, for the resistance to be overcome is slight and the wing is pulled up edgewise. Besides ordinary flight, and the soaring of the lark and the hovering of the kestrel, there is the gliding of a falcon as it descends upon its quarry, and the more impressive "sailing" of the albatross and some other big-winged birds, which take advantage of air-currents to continue moving for a long time with few or no wing-strokes.

The mastery of locomotion which birds display in flight has its counterpart in the swimming feats of petrels and penguins, in the diving of gannets and guillemots, and in the swift gait of the ostriches. The strokes of the wings directly assist in respiration, in driving out the air from the lungs, which are fixed to the ribs and are virtually inextensible. As in insects, expiration is active and inspiration passive, the opposite of what holds in mammals. In connexion with their breathing birds have a system of air-sacs continuous with the lungs, and often extending even into the cavities of bones. These air-sacs serve as reservoirs accessory to the lungs, whose efficiency they increase, and they help to regulate the high temperature of the body by serving as areas of "internal perspiration." Most birds take a good deal of water, and most of the surplus is got rid of on the walls of the air-sacs, for birds have no sweat-glands in their skin, and their urine is semi-solid.

In correlation with their highly developed muscularity birds have acute senses of sight and hearing, and a relatively large brain. The

sense of smell seems to be very poorly developed in the majority of birds, though of importance in exceptional cases, such as owls. The sense of taste is also slight, and there is not much tactility except in the cere, which overhangs the nostrils and is continued down the bill—a very important organ in birds that probe the soil, like woodcock, or root about in the mud, like ducks. The ear has no external trumpet and its opening is hidden in the feathers, but the sense of hearing is very acute.

The most highly developed sense, however, is that of sight, which means everything to a bird, and the power of accommodation or rapidly altering the focus of vision is greater than in any other creatures. The well-developed brain is the seat of considerable intelligence—finely expressed in rooks, cranes, and parrots—and also of numerous inborn capacities or instincts. It seems probable that the instinctive behaviour of birds, which is familiarly displayed in their nest-building, in their care for the young, in their song, and in their ways of obtaining food, is more or less mingled with intelligence. There is reason to believe that the inborn instinctive predispositions have their seat in the lower brain centres, that their activity often awakens capacities of intelligent control and adjustment which are resident in the cortex of the cerebral hemispheres, and that the ordinary behaviour of birds illustrates an inextricable economical mingling of instinctive and intelligent activities.

Formation of Eggs

The egg-cell or ovum of a bird is very small to begin with, when it lies in the ovary. But from the blood-supply to the ovary it accumulates reserve nutritive material in the form of yolk; it becomes greatly expanded and surrounded by a firm envelope. At one pole of the ripe ovum there is a small disk of living matter with a nucleus, lying like an inverted watch glass on the top of the purely nutritive yolk. Either before it leaves the ovary, or in the upper part of the oviduct, the ovum is fertilised by a spermatozoon from the male.

During its passage down the oviduct it becomes surrounded by various coatings of albumen, by a tissue-paper-like shell-membrane, and by a porous shell of carbonate of lime often beautifully and sometimes protectively marked by pigments related to those of the blood and the bile. As the egg often continues moving down the oviduct,

broad end first, before the pigments are fixed, all sorts of streaks and blotches result, almost always with a pattern characteristic of the species. In some birds, such as guillemots and black-headed gulls, the coloration of the eggs is extraordinarily variable. In some cliff-birds, such as guillemots and razor-bills, the top-shaped egg rotates on its short axis when it is jostled, and does not readily roll off the ledge into the sea. If the egg-cell be not fertilised, it cannot, of course, develop; but it may be surrounded in the normal way with white of egg and shell.

The whole of the embryo bird is formed from the growth of the disk of living matter on the top of the yolk. It has at first a close resemblance to any other embryo reptile; it shows the same embryonic envelopes—the protective amnion and the respiratory allantois; it breathes by means of blood-vessels spread out on the allantois, utilising the air which comes through the porous shells; it feeds on its legacy of yolk (for three weeks in the case of the chick); and when it is fully formed it breaks its way through the egg-shell by blows with its beak, and enters the world either as a very helpless nestling or as a precocious chick able to run about almost at once.

Many male birds, particularly at the breeding season, have a very strongly developed sense of territory, and upon the arrival of a female in his domain the male will defend her and it against all rivals.

Birds play an important part in checking the multiplication of small mammals (such as mice and voles), snails, and injurious insects. Some birds destroy useful animals, such as edible fishes, others destroy weeds, but the activities of birds are of value to mankind to an extent which entirely outweighs any injuries they may do.

Place of Birds in Nature

A critical survey of the economic importance of the birds of a country will reveal the fact that the vast majority are directly beneficial, that many which undoubtedly levy a tax do nevertheless much more good than harm, and that there are very few for which no good word can be said. Apart from their aesthetic value to mankind, they play an indispensable part in preserving the balance of nature on which the continuance of our race depends.

The careless introduction of a bird into a new area may be very costly, *e.g.* the European sparrow

in the U.S.A.; but the elimination of a rare bird of paradise is worse, for the loss is irreparable.

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PROTECTION OF BIRDS. In the U.K. the Royal Society for the Protection of Birds was founded in 1889 by women as a protest against the prevalent destruction of plumage birds for millinery. Incorporated by royal charter in 1904, it supports all measures for the protection of wild birds, and to its work have been due measures passed by parliament to protect birds. It also does educational work, *e.g.* through competitions in schools. In France there is a league for the protection of birds, in Switzerland a bird protection society, in the U.S.A. the national association of Audubon societies for the protection of wild birds and animals. The U.S.A. and Canada have a treaty protecting migratory birds. Among officially guarded areas where birds can live and breed in security are Yellowstone national park in the U.S.A.; La Bérarde in the French Alps; reservations in the islands of the Baltic; and bird sanctuaries in many parts of the British Isles (including one in Hyde Park, London).

A convention for protecting birds which destroy insect pests was concluded between most of the countries of Continental Europe in 1902; and in most European countries, in the U.S.A., in Canada, and elsewhere official protection is given to birds, especially to rare birds, migratory birds, and plumage birds.

In Great Britain, game birds are protected by the Game Laws (*q.v.*). The Wild Birds Protection Act, 1880, was the first act to give official protection to wild birds. It was followed by others, and in 1954 a Protection of Birds Act was passed replacing, consolidating, and amending the earlier acts; it provided protection for certain wild birds, their nests, and their eggs; prohibited the use of baited boards, bird-lime, and live birds as decoys for the taking of wild birds; and restricted the sale of wild birds, alive

or dead, of their eggs, their skin, and their plumage, and the importation of wild birds. Penalties for offences under the act were fines up to £25, or imprisonment for up to three months, or both.

The act included three schedules; the first named 44 birds protected at all times, and included rare birds such as the hoopoe, the avocet, the golden oriole, the osprey, Montague's harrier, and all species of eagle; the second named wild birds which may not be taken or killed during a close season and included the capercaillie, the coot, the moorhen, the woodcock, the golden and the grey plover, common and jack snipe, certain species of duck and of geese; the third related to 61 wild birds (among them the cuckoo, the chaffinch, and the lark) which may not be sold alive (a proviso that does not apply to ringed birds of the same species reared in captivity).

Bird, CYRIL KENNETH (b. 1887) British humorous artist. He was educated at Cheltenham College, and while serving in the Royal Engineers in the First Great War he adopted the pseudonym of Fougasse (small explosive mine) for his first drawings sent to magazines. Under this pseudonym his drawings for Punch became famous. Notable for its extreme economy of detail, his work revealed a brilliantly developed sense of the ludicrous. He was art editor of Punch, 1937-49, and editor, 1949-52. His work is collected in many publications.

Birdcage Walk. London thoroughfare on the S. side of St. James's Park. It was so called from the aviaries beloved by Charles II. Its largest and most prominent building is Wellington Barracks, erected in 1845. The Guards' chapel was destroyed with the loss of many lives by a flying bomb on June 18, 1944.

Bird-Eating Spider OR BIRD-CATCHING SPIDER. Popular name for a large number of species of spider of the sub-order Mygalomorpha, of tropical distribution and particularly abundant in South America. All the species are large and very hairy, the largest having a body length of about 4 ins. Most of them live in trees, making silken retreats between leaves or in natural cavities. They do not construct a web, and they hunt their prey which consists of large insects and small birds and mammals. An occasional specimen reaches Great Britain in a cargo of bananas.

Birdjand. Town of Khorassan, Persia. About 250 m. S. of Me-

shed, it stands over 4,500 ft. high. It has a college and caravanserais, and is famous for its carpets and saffron. Pop. 20,000.

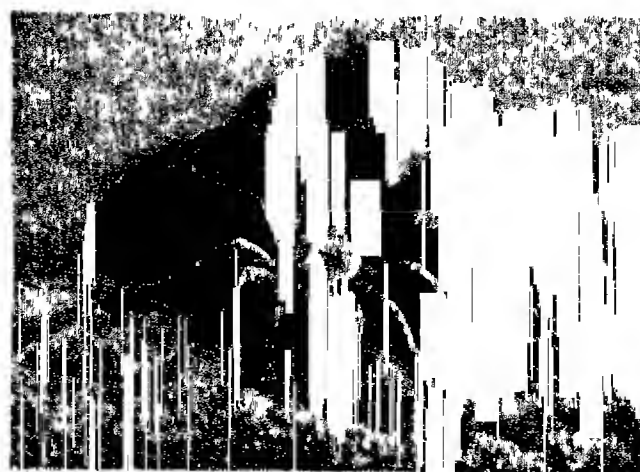
Birdlime. Sticky substance which draws out into long tough strings. It is smeared on trees or netting to snare small birds. Birdlime proper is made from the inner bark of the holly-tree, mistletoe berries, the woolly-stemmed distaff thistle (*Carthamus lanatus*), the Canary Island house-leek, and other trees and plants. A similar substance can be obtained from the gluten of wheat flour. It is a criminal offence punishable by fine or imprisonment to use birdlime to catch birds.

Bird Louse. Parasitic insect of the order Mallophaga (Gr. *mallos*, wool; *phagein*, to eat). The lice do not prey on the bird itself, but eat the feathers. Dusting with powdered sulphur is the best remedy.

Bird of Paradise. Member of a family of passerine birds, *Paradisaeidae*, closely related to the crows and famed for their beautiful plumage. There are over fifty species, all natives of the E. Indies and N. Australia. The males in the breeding season put on a dress of extraordinary magnificence.

Bird of Paradise Flower (*Strelitzia reginae*). Perennial herb, member of the family Musaceae. It is a native of S. Africa. The fine, oval-oblong leaves, on long, erect stalks, are produced direct from the rootstock, and stand about 5 ft. high. The flower-cluster is at first enclosed in a boat-shaped spathe. Each flower consists of slender sepals and petals brilliantly coloured with orange and purple. The seeds are used as food by the Kaffirs. *S. augusta* is much larger but, the flowers being whitish, it is therefore less striking.

Birdoswald. Site of the Roman British station of Cambo-glanna, Cumberland. The largest fort on Hadrian's Wall, its masonry ramparts enclose 5½ acres. An illustrated inscribed slab refers to a Dacian cohort using the Balkan scimitar. The Maiden Way ran



Bird-catching spider of S. America, and its nest on the branch of a tree

to Bewcastle and beyond. See Britain; Hadrian's Wall.

Birds, THE. Name of a comedy by Aristophanes. Produced 414 B.C., a kind of fairy extravaganza, it describes an ideal bird state and castle in the air, Cloud-cuckoo-town, in the building of which Prometheus and other gods take part. It contains more charming and graceful passages than any of the poet's other comedies.

Bird's-Eye. Name sometimes applied to *Adonis autumnalis*, a red flowered member of the buttercup family (Ranunculaceae), which is also known as pheasant's-eye (*q.v.*). The bird's-eye primrose is *Prinula farinosa*. The name is also used for knotted wood obtained from the field maple, and for a tobacco in which the stalks give a spotty appearance.

Bird's-foot (*Ornithopus perpusillus*). A small annual herb of the family Leguminosae, native of



Bird's-foot, *Ornithopus perpusillus*

Europe and N. Africa. Its numerous branching thread-like stems lie on the ground. The leaves are broken up into from 6 to 14 pairs of narrow leaflets, and the tiny white flowers, veined with red, are gathered into heads of from

three to six blossoms. The curved seed-pods are jointed, each section containing one seed, and the three pods springing from a common stalk look remarkably like the claws of a small bird. An allied species, *O. sativus* (by some considered a variety of *O. perpusillus*), a native of Portugal, is grown for fodder on poor soils.

Bird's-foot Trefoil (*Lotus corniculatus*). Perennial herb of the family Leguminosae, a native of Europe, N. Africa, and Asia. Known as lady's slipper, it is valuable in pasture and meadow.

Bird Song. The various sounds emitted by birds are caused by the action of a membrane in the syrinx, at the junction of windpipe and bronchi. The syrinx varies greatly in different orders of birds, resulting in great differences in quality of sound, ranging from mere chirps to recognizable melody such as can be transcribed, and including the cawing of a rook no less than the majestic notes of a nightingale. The form of the songs is deter-

mined in part by the imitative nature of all birds, which usually copy the songs of their parents, though blackbirds and thrushes are among those which show invention and individuality. Song is almost exclusively the habit of the cock bird, and is mostly used in the mating season and particularly at dawn; but it appears to express other emotions also, *e.g.* the nightingale is stimulated to song by rival sounds, and some hedge birds sing as they hunt. Generally speaking, the finer the song, the duller the plumage. Certain birds can be trained in song, the starling being particularly receptive. Linnets and canaries are bred for song, and the quality of "glucks" and "rolls" in a canary's song will determine its market price.

Chief songsters in Great Britain are the nightingale (long, meditative notes, clear and dominant), blackbird (flute-like contralto and wide range of repetitive melody in a minor key), thrushes, missel and mavis (notable for persistence and variety), blackcap (cascade of silvery music with characteristic sudden finish), wood warbler (long, intense trills), willow warbler (long rise and fall), wren, robin, and skylark. The cuckoo's limited range is familiar to everyone; and other calls to be noted are the mournful cry of the curlew and the invariable rhythmic call of the wood pigeon, always broken at the same note. The best place to study bird song is in a wood at dawn in late spring.

Birdum. Town of Northern Territory, Australia. It is 316 m. S.S.E. of Darwin and the terminus of the North Australian Rly. to that port. It is the centre of a cattle-raising district.

Birdwood, WILLIAM RIDDELL BIRDWOOD, 1ST BARON (1865-1951). British soldier. Born in India Sept. 13, 1865, a nephew of Sir G. Birdwood, he was educated at Clifton and Sandhurst. Joining the Scots Fusiliers in 1883, he transferred to the 11th Bengal Lancers in



Lord Birdwood,
British soldier

1887, seeing much active service on the Indian frontier from 1891 to 1898. In the South African War Birdwood served on the staff and was severely wounded. In 1902 he was appointed military secretary to

Lord Kitchener, returning with him to India as assistant military secretary and interpreter. After having acted as chief staff officer on the Mohmand expedition, Birdwood was given command of a brigade. From 1912 to 1914 he acted as secretary to the government in the army dept. and was a member of the governor-general's legislative council.

At the outbreak of the First Great War Birdwood was selected to command the Australian and New Zealand army corps, which he led in Egypt and Gallipoli. On Sir Ian Hamilton's retirement he assumed command of the army in Gallipoli, and led the Australian and New Zealand forces in France 1916-18.

After the armistice of 1918 he commanded the Australians in England, and was created a baronet and G.C.M.G. 1919. Appointed to the Northern Command, India, in 1920, Birdwood was C-in-C. of the army in India, 1925-30, having been promoted to field-marshal in 1925. Master of Peterhouse, Cambridge, 1931-1938 (where he had bathrooms installed), he was appointed captain of Deal Castle in 1935. In 1938 he was made a peer, dying May 17, 1951. An autobiography, *In My Time*, was published 1945.

Birdwood, SIR GEORGE CHRISTOPHER MOLESWORTH (1832-1917). British author and scientist. Born at Belgaum, Bombay, Dec. 8, 1832, he was the son of a general. Having graduated in medicine at Edinburgh university, he entered the Bombay medical service, and was made professor in the Grant medical college, and curator of the government museum, Bombay. He is chiefly known as a voluminous writer on Indian subjects, and as one of the founders of the Victoria and Albert Museum and the Victoria Gardens, both in Bombay. Birdwood was one of the founders of primrose day. He was commissioner for various great exhibitions, including that at Chicago in 1893, was knighted in 1881, and died June 28, 1917.

Birejik OR BIR. Walled town of Turkey, Urfa vilayet. On the Euphrates, at the head of navigation, 78 m. N.E. of Aleppo, it is a caravan centre, and has a ruined castle and several mosques.

Bir-el-Gobi. Track junction about 20 m. S. of Sidi Rezegh, Libya. In Dec., 1941, there were several tank engagements in the area during the fighting to relieve Tobruk. On Dec. 4, Indian troops supported by British tanks,

and a British mobile column to the N., between them destroyed 18 Italian tanks; on the following day, 15 more Italian tanks. On Dec. 8 Rommel, declining a pitched battle, withdrew. British Imperial troops relieved Tobruk next day.

Biretta (Italian *berretta*; O.E. barret-cap). Form of head-dress for men, once worn as a mark of honour by scholars and others. The word is usually applied to the square or three-cornered cap of silk or other stuff worn by R.C. and High Anglican ecclesiastics. The



Biretta, or three-cornered cap, worn by ecclesiastics

non-episcopal form of the mitre, the cap for cardinals is red, for bishops violet or black, for priests black.

Bir Hacheim. Track junction in Libya, 40 m. S.E. of Gazala. In May, 1942, the British 8th army lay within the quadrilateral Gazala—Tobruk—Bir el Gobi—Bir Hacheim, the last held by the 1st Free French bde. under Gen. Koenig. During the night of May 26-27 Rommel attacked, moving armoured formations round the S. of Bir Hacheim towards El Adem, and attacking Bir Hacheim itself. Neither move succeeded. A British counter-attack on June 4-5 failing, Rommel set about reducing Bir Hacheim. Despite repeated heavy attacks by ground forces and dive bombers, the French refused to surrender; but on June 10 Gen. Ritchie ordered them to evacuate the post. Bir Hacheim secured, Rommel was free to concentrate against Tobruk.

Birkbeck, GEORGE (1776-1841). Founder of mechanics' institutions in Great Britain. The son of a



George Birkbeck,
British philanthropist

banker, he was educated at Edinburgh university, where he graduated in medicine in 1799. As professor of natural philosophy at the Andersonian University (later Anderson's College), Glasgow, 1800-4, he lectured to a mechanics' class, which in 1823 developed into the Glasgow Mechanics' Institution. In 1823, when a successful physician in London, he helped, with Brougham, to

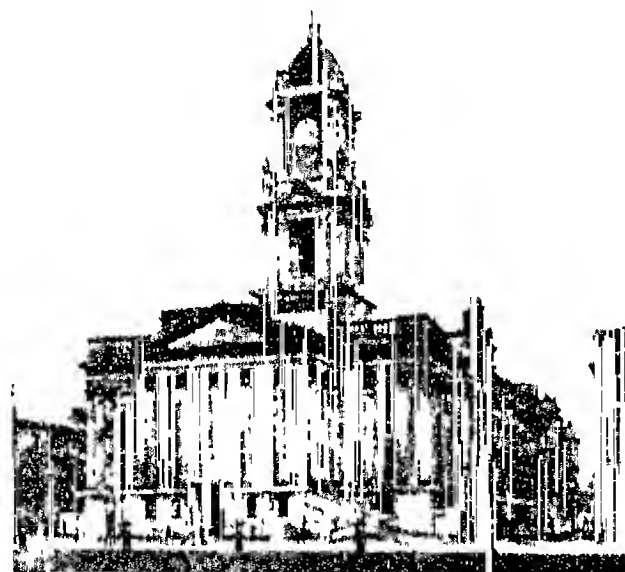
found the London Mechanics' Institution. Birkbeck was one of the founders of University College, London. He died Dec. 1, 1841.

Birkbeck College. Constituent college of the University of London. Founded in 1823 as the London Mechanics' Institution by George Birkbeck, Thomas Hodgskin, and J. C. Robertson in association with Lord Brongham and Francis Place, it developed after 1840 into a popular literary and scientific institution. Shortly before 1870 it began to prepare students for external degrees of London University. By 1907, when it assumed the name Birkbeck College, the institution had become wholly academic in the service of the part-time student. A constituent college of London University from 1920, in 1926 it was granted a royal charter setting forth its chief object as the provision of university education "for persons engaged in earning their livelihood during the daytime." Instruction is principally through evening classes, although postgraduate students engaged in full-time research are admitted. The college removed to new buildings in Malet Street, London, W.C.1, in 1951.

Birkenhead. British troopship. On the night of Feb. 25, 1852, she struck a sunken reef at Danger Point, a few miles S. of Simons-town, Cape Colony. The behaviour of the soldiers and crew after the ship struck is an immortal story. The women and children were put into the boats. The men fell in and stood to their ranks. All refused to make for the boats as this would have imperilled the women and children. Of 638 on board, only 194 (including all the women and children) were saved.

Birkenhead. Co. bor., seaport, and market town of Cheshire, England. Situated opposite Liverpool, on the W. bank of the Mersey estuary, it is 194 m. N.W. from London, on two main railways. It was an obscure village before the opening of the first dock at Wallasey Pool in 1847, which was the beginning of Birkenhead's rapid rise to prosperity. The docks now cover more than 800 acres, and are controlled by the Mersey Docks and Harbour Board.

The principal docks are the Egerton, Morpeth, Bidston, East



Birkenhead. The Town Hall, which overlooks Hamilton Square
Valentine

Float, West Float, and Wallasey, and the 12 m. of quays are equipped with large warehouses. Shipbuilding is of first importance, many large vessels afloat having been built at Laird's yards.

Birkenhead has ferry, road, and rly. connexion with Liverpool. (See Mersey Tunnel). Buildings include town hall, hospitals, public abattoir, free library, art gallery, and many schools. There are several parks and open spaces. On Bidston Hill are an observatory and a tidal institute which predicts tides for all parts of the world. Market days, Fri. and Sat. Part of Birkenhead forms a bor. constituency; the rest is in Bebington bor. constituency. Pop. (1951) 142,392.

Birkenhead had its origin in the Benedictine priory of Byrkhed, founded about the middle of the 12th century. It received its charter in 1877, and was created a co. bor. in 1888.

Birkenhead, FREDERICK EDWIN SMITH, 1ST EARL OF (1872-1950). English lawyer and politician. Born at Birkenhead, July 12, 1872, the son of a barrister, he was educated at Wadham College, Oxford. He took high honours in law, was president of the union, won a reputation as a fluent and somewhat audacious speaker, and was elected to a fellowship at Merton College in 1896. He was for some years a university lecturer, and was called to the bar, becoming a K.C. in 1908.

In 1906 Smith was returned to parliament as Conservative member for the Walton division of Liverpool, and there his rise was



Earl of Birkenhead.
British lawyer
Russell

as rapid as at the bar. His maiden speech against the government March 13, 1906, was generally allowed to have been the most brilliant maiden speech ever heard. In 1915 he joined the Coalition government as solicitor-general, was knighted and made attorney-general. During 1919-22 he was lord chancellor. Created baron 1919, he took the name Birkenhead; he was made Viscount Furneaux 1921, earl of Birkenhead 1922. Averse from the policy of breaking the coalition, he did not take office under Bonar Law, but joined Baldwin's second ministry as secretary for India, 1924, resigning in 1928. He then entered business and became a director of L.C.I. He died Sept. 30, 1930.

He wrote much, but with the exception of his erudite exposition of international law, of which the fourth edition appeared in 1911, his books had perhaps only a contemporary value. They included *Points of View*, 1923; *Famous Trials of History*, 1926; *Last Essays*, 1930; *Fifty Famous Fights in Fact and Fiction*, 1932. As an orator he was unsurpassed, and many of his remarks in parliament and law courts have become classics of wit. He married Margaret Furneaux, 1901. Their son Frederick (b. 1907) succeeded as second earl; their elder daughter was Lady Eleanor Smith (*q.v.*). An eldest son is called Viscount Furneaux.

Bibliography. Life, by his son: *First Phase*, 1933, *Last Phase*, 1935; *Speeches*, 1935; *Smith of Birkenhead*, H. A. Taylor, 1931.

Birket-el-Hadji (lake of the pilgrims). Marshy depression in Egypt. Lying about 2 m. N.E. of Heliopolis, it is reached by the line from Cairo to El Merg.

Birket-el-Kerun (lake of the horns). Lake of Egypt. It lies a few miles N.W. of Medinet-el-Fayum, and forms all that remains of the Lake Moeris of the Greeks. Its area is about 770 sq. m. The waters, about 140 ft. below sea level, are only slightly brackish. It is reached by the Fayum rly. from El Wasta. See Fayum.

Birkett, SIR WILLIAM NORMAN (b. 1883). British judge. He was born at Ulverston, Lancs., on Sept. 6, 1883, and was educated at Barrow-in-Furness and Emmanuel College, Cambridge. He was called to the bar, Inner Temple, in 1913, took silk in 1924, and made a brilliant forensic reputation. One of the most spectacular trials in which he appeared as

counsel for the prosecution was that of Rouse for murder in 1931.

At the beginning of the Second Great War Birkett placed his services at the disposal of the government, and became chairman of the advisory committee set up to assist the home secretary by hearing appeals by persons detained under Regulation 18B. In 1940 he gave a series of broadcasts as *Onlooker* which pleased a wide public. He gave many lectures in the U.S.A. on behalf of the ministry of Information.



Sir Norman Birkett,
British judge

Birkett sat as Liberal M.P. for Eastern Nottingham 1923-24 and 1929-31. Knighted and raised to the bench in 1941, he was one of the British judges at Nuremberg war crimes trials 1945-46. Made P.C. in 1947, he was appointed a lord justice of appeal 1950, retiring 1957. A man of great humanity and wide interests, he served as chairman of the standing committee on national parks and of the advisory council for the treatment of offenders.

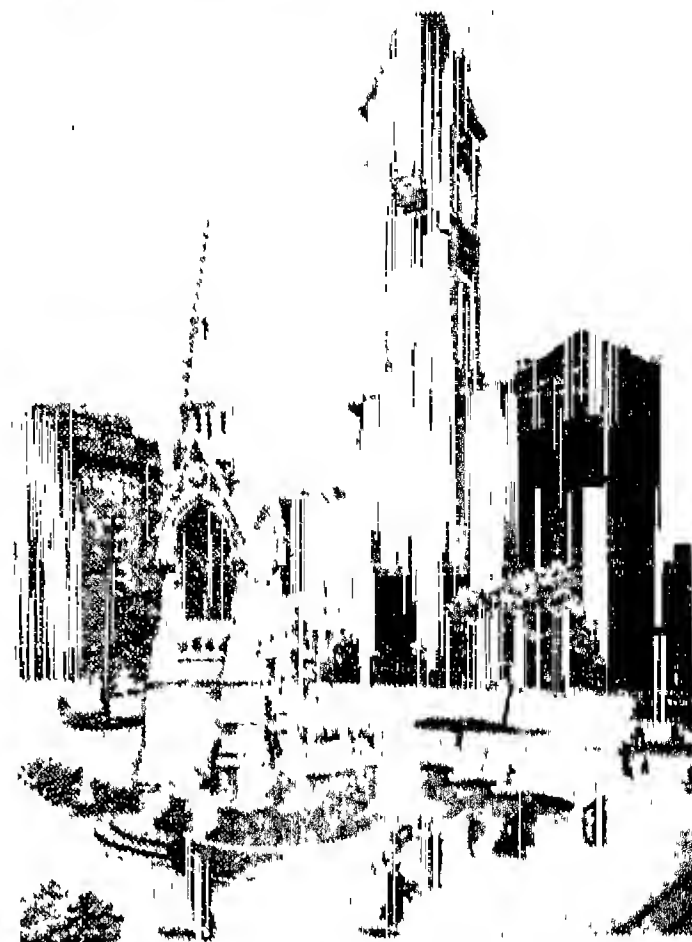
Birla Brothers. Indian industrial organization controlling paper, sugar, cotton, and jute mills, factories producing bicycles, motor cars, and textile machinery, import and export businesses at Bombay and Calcutta, banking and insurance companies. It was founded by the four sons of Raja Baldevdas Birla (1863-1956), a well-known philosopher and philanthropist, Rameshwardas Birla (b. 1892) and Ghanshyamdas Birla (b. 1894) being the first joint managing directors. Ghanshyamdas was a member of the second Round Table conference in London, 1930, and unofficial adviser to the government of India for Indo-British trade negotiations, 1936-37; he also promoted education by founding and financing schools in various parts of India.

Birmingham. County borough of Warwickshire, the largest provincial city in England. It lies 111 m. N.W. of London, and is the chief metal-working town in the U.K.; area, with

suburbs extending into Worcestershire and Staffordshire, about 80 sq. m. More than 1,200 trades are carried on within the city, the number of individual undertakings registered exceeding 8,000, many of them small. Metal products range from the smallest pins, and wire as fine as a hair, to rolling stock and mammoth presses. In both great wars Birmingham became a vast arsenal and, during the Second, turned out tanks, all sorts of vehicles, Bailey bridges, aircraft, aircraft components and accessories, badges and buttons, shot and shells.

The manufacture of jewelry is a long-established industry—the Birmingham assay office was established in 1773; and in 1939 half the country's gold and silver goods were made in Birmingham. Brassfounding and the making of brassware is also important. Plastics are produced. The city is noted for the production of pedal and motor cycles, motor cars, and motor accessories. Making of glass, chemicals, and confectionery are other industries. Bournville (*q.v.*) is near by.

Birmingham is served by two main rly. stations—New Street and Snow Hill—and more than 40 suburban stations. The airport is at Elmdon, S.W. of the city. Local transport is by bus. By the Corporation Water Act of 1892 a water supply was obtained from the Elan Valley, Wales, at a capital cost of more than £6,000,000. The aqueduct, 73 m. long, has a capacity of 75,000,000 gallons daily. There are a corporation savings bank started during

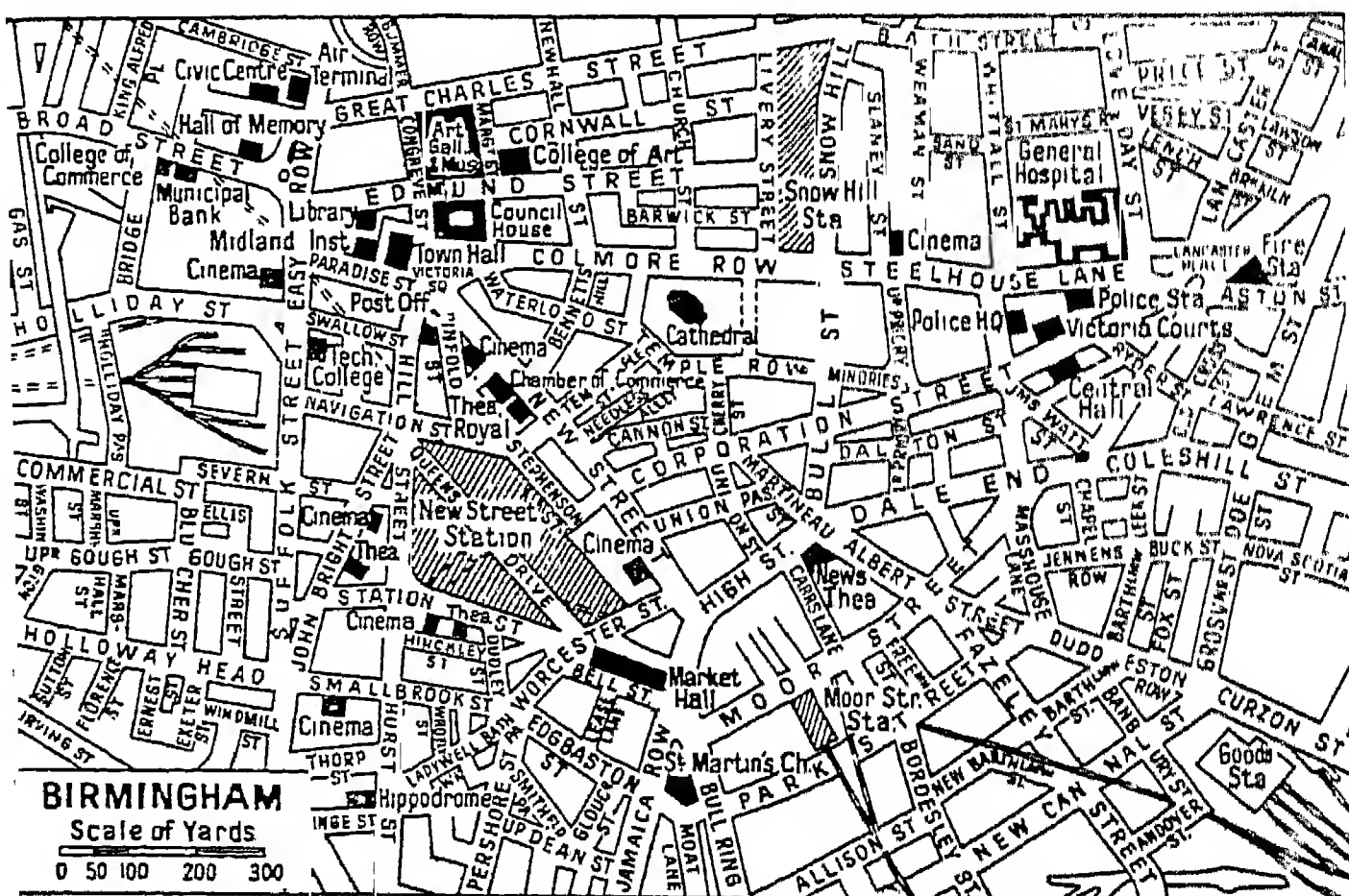


Birmingham. Chamberlain Square, with memorial fountain to Joseph Chamberlain, benefactor of the city

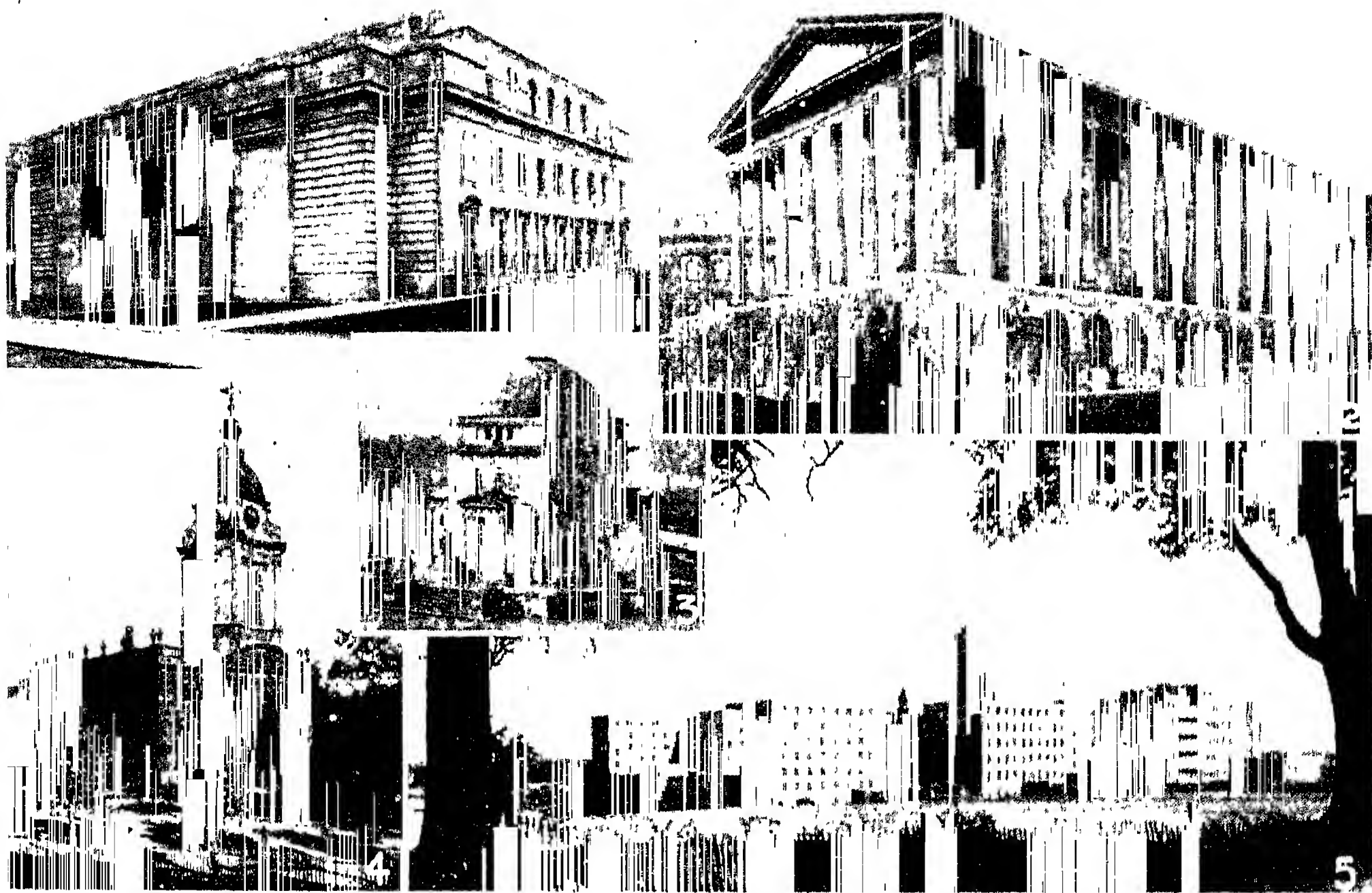
the First Great War and a municipal bank opened in 1919.

The classical town hall in Victoria Square, built during 1834-50, was designed by James Hanson (originator of the Hanson cab) and John Welch, in imitation of the temple of Jupiter Stator at Rome. Triennial music festivals, inaugurated in 1768, were held in the hall, and Mendelssohn's *Elijah* was specially composed for the festival of 1846. Opposite the town hall is the council house, connected by a bridge with the city art gallery and museum in Edmund Street, the art collections in which include notable works by Burne-Jones and David Cox, both natives of Birmingham.

Birmingham is the seat of an Anglican bishopric and of a



Birmingham. Plan of the central area of this large city of the Midlands



Birmingham. 1. Municipal Bank, opened in 1919. 2. The classical town hall, built 1834-50. 3. Hall of Memory, a memorial to those who fell in the First Great War. 4. Cathedral. 5. Queen Elizabeth Hospital, opened in 1938

Photos, 1, 3, and 4, J. Willoughby Harrison; 5, H. J. Whitlock and Sons

Roman Catholic archbishopric. The bishopric, constituted in 1905, embraces the city, other parts of Warwickshire, and parts of Staffordshire and Worcestershire. S. Philip's, built 1711-19 in the Palladian style, was made the cathedral church; it was designed by Thomas Archer, a pupil of Vanbrugh; it has stained glass by Burne-Jones. The 13th-century parish church of S. Martin was rebuilt 1872-85. S. Chad's R.C. cathedral was built by A. W. Pugin, 1839-41; its 15th-century stalls and 16th-century oak pulpit came from churches at Cologne and Louvain. The oratory of S. Philip Neri, at Edgbaston, was established in 1847 by Cardinal Newman, to whom the church of the Immaculate Conception, completed 1909, is a memorial. Carrs Lane Congregational church achieved fame under the ministries of W. R. Dale and J. H. Jowett. The chief Methodist church is the Central Hall. The synagogue on Singer's Hill was consecrated in 1856.

Birmingham University is described below; other educational institutions include the King

Edward VI high schools, Edgbaston; the college of technology, which prepares students for external degrees in many branches of applied science; the college of arts and crafts; the Birmingham and Midland Institute, used for lectures and evening classes, especially in music; and the Selly Oak colleges for theological and social studies. The hospitals centre at Edgbaston works in conjunction with the medical faculty of the university.

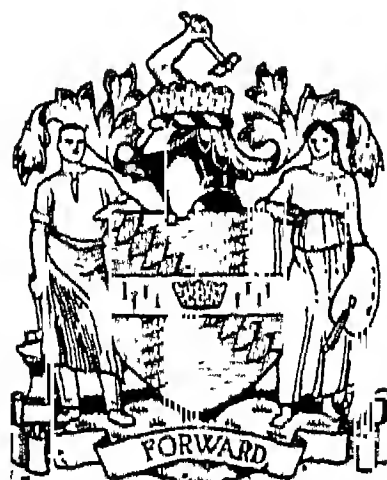
Other institutions of importance are the central library, including the Shakespeare memorial library and the Boulton and Watt museum; the Victoria law courts; and the Hall of Memory, erected 1923-25 in honour of the 12,320 citizens of Birmingham who fell in the First Great War. New Street and Corporation Street are the chief shopping centres, and Colmore Row has professional and banking offices.

There is a marble Gothic fountain in memory of Joseph Chamberlain in Chamberlain Square; the 325-ft.-high central tower of the university is also a memorial to him. Citizens commemorated by

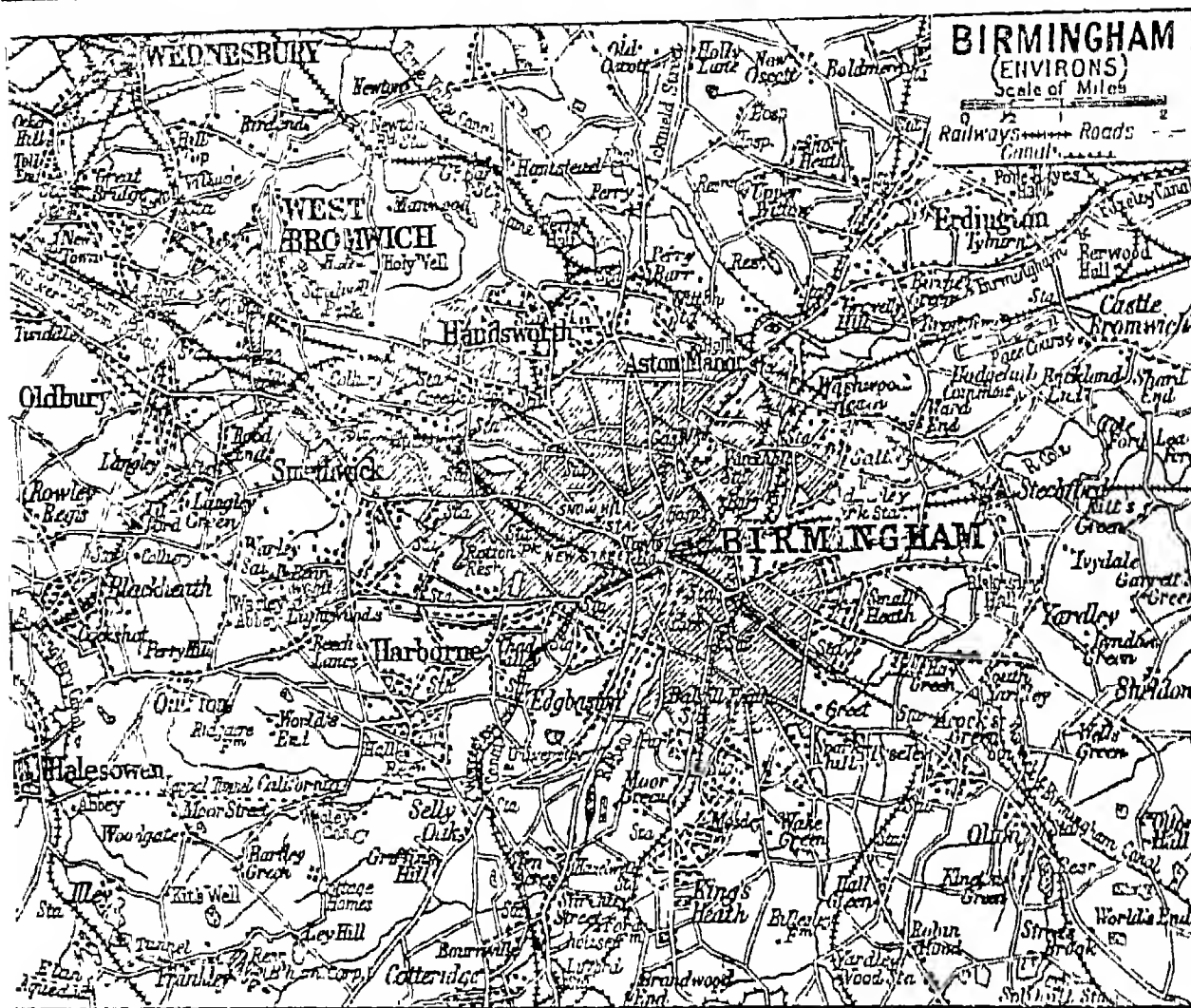
statues are James Watt, Joseph Priestley, Sir Josiah Mason, and Thomas Attwood, founder of the Birmingham political union. Sir Rowland Hill, son of a Birmingham schoolmaster, has a statue in the G.P.O. in Victoria Square. In Victoria Square also there are statues of Queen Victoria, Edward VII, and Nelson. Parks and open spaces occupy 4,200 acres.

The site upon which Birmingham stands has indications of a small Roman settlement; it was of some importance in Anglo-Saxon times. A market is believed to have existed before the Norman conquest; but the first extant market charter was granted by Henry II in 1166. The medieval town was not particularly noted for its metal-workers, but John Leland, touring the country in 1538, noted that "There be many smiths in the town that use to make knives and all manner of cutting tools, and many lorimers that make bittes and a great many naylors. So that a great part of the town is maintained by smiths, who have their iron and sea coal out of Staffordshire."

From the time of the Civil War Birmingham has produced weapons, especially small arms. It made 15,000 sword blades for



Birmingham arms



Birmingham. Map showing the environs of this metropolis of the Midlands

the Parliamentarians, but refused to supply the king's forces, which was one of the reasons Prince Rupert sacked and burnt the town in 1643.

The rapid expansion of industry in the 18th century was due to the accessibility of coal and iron; it was given a fillip by the partnership of James Watt and Matthew Boulton at the famous Soho manufactory. William Murdoch, who invented lighting by gas, was later associated with them. In the 18th century, the great chemist and Unitarian minister Joseph Priestley and the printer John Baskerville influenced the town's intellectual as well as industrial life.

During the American Civil War nearly 800,000 guns went from Birmingham to the U.S.A. John Bright and Joseph Chamberlain and his sons brought political fame to Birmingham in the 19th and 20th centuries. A centre of Non-conformity and Unitarianism, Birmingham also became, through Cardinal Newman, a stronghold of Roman Catholicism.

The lords of the manor held jurisdiction over Birmingham until 1769, when the first formal system of local government came into operation. When the Municipal Corporations Act was passed in 1835, Birmingham applied for a charter, granted in 1838; and a mayor, 16 aldermen, and 48 councillors were elected. In 1889 city status was acquired, and in 1896 the title of lord mayor was conferred upon the chief magistrate. The city boundary was greatly extended in 1911,

to take in the districts of Handsworth, Aston Manor, Erdington, Yardley, and King's Norton and Northfield, and there were further small extensions in 1928 and 1931. In 1955 Birmingham was divided into 13 borough constituencies; and the council consisted of 38 aldermen and 114 councillors.

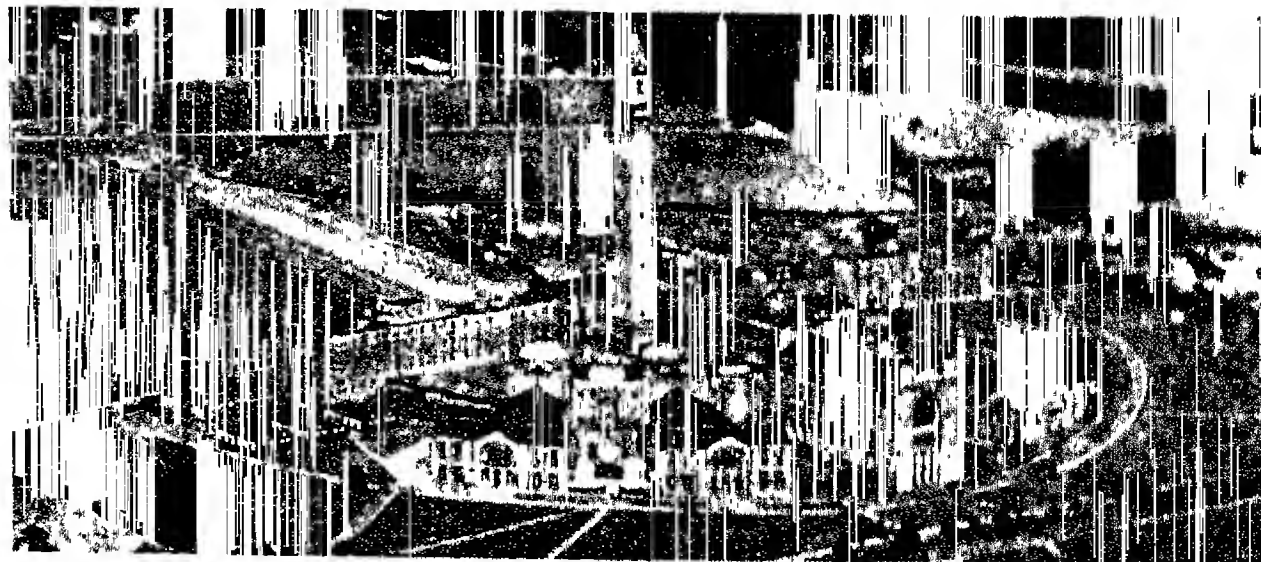
During the Second Great War Birmingham suffered severely from air attacks; 2,227 people were killed. The market hall, built 1833-35, was destroyed, and both cathedrals were damaged, as were the council house, art gallery, and university.

BIRMINGHAM UNIVERSITY. This seat of learning in the Midlands of England has five faculties: science (pure and applied), which includes a school of malting and brewing; arts, which includes a department of education; medicine, including a school of dental surgery; commerce and social science, which includes a department of social study; and law. The university

maintains four halls of residence, three for men students, one for women. Associated with the university are the Barber institute of fine arts, founded 1939 (which has a department of music), and the Shakespeare Institute, established in 1951 at Stratford-upon-Avon for the encouragement of advanced study and research on Shakespeare and related subjects.

The University of Birmingham developed out of the Mason science college, founded by Sir Josiah Mason in 1880. In 1892 it was renamed Mason College, and absorbed the medical faculty of Queen's College, founded as a school of medicine in 1828. In 1894 the Birmingham training college for teachers in elementary schools was transferred to Mason College, which was made a university college in 1897. In 1898 Joseph Chamberlain, as president of the college, led the movement to acquire university status. An endowment fund was opened, ultimately reaching about £500,000, and in 1909 the university received its charter, prescribing instruction in all branches of a liberal education, particularly in relation to the manufacturing, commercial, and industrial pursuits of the Midlands. On July 7, 1909, Edward VII opened the new buildings at Edgbaston, erected on a site of nearly 50 acres presented by Lord Calthorpe; subsequent gifts nearly doubled the site area.

Birmingham. Largest city of Alabama, U.S.A., the co. seat of Jefferson co. It is 97 m. N.N.W. of Montgomery, just S. of the Appalachian Mts., and is served by the Southern and other rlys. It owes its origin to the discovery of coal and iron in the locality. Its iron and steel manufactures are of first importance; cotton textiles, chemicals and explosives, furniture, building materials are among its other products. It is an important air and rly. terminus, a port of entry, and an air force base. The



Birmingham University. View from the air of the university buildings, erected on a site at Edgbaston presented by Lord Calthorpe, and since enlarged

city contains many fine buildings, among them Howard and Birmingham colleges, and two large hospitals. Founded and incorporated in 1871, Birmingham was named after the English city. On Red Mountain not far from the city is a huge iron statue of Vulcan. Pop. (1950) 326,037.

Birmingham, GEORGE A. Pen-name of James Owen Hannay (1865-1950), British author. Born at Belfast, July 16, 1865, educated at Haileybury and Trinity College, Dublin, he was ordained, 1888, was rector of Westport, Mayo, 1892-



1913; canon (Canon Hannay), of S. Patrick's, Dublin, 1912-21; rector of Mells, 1924-1934; vicar of Holy Trinity, Kensington Gore, London, from 1934. He wrote many novels, notable for their whimsical humour and vivid Irish backgrounds, e.g. *The Seething Pot*, 1905; *Spanish Gold*, 1908; *Goodly Pearls*, 1926; *Magilligan Strand*, 1938; *Poor Sir Edward*, 1943. His plays included *General John Regan*, 1913; *Send for Dr. O'Grady*, 1923. Under his own name he pub. books of theology and travel. He died Feb. 1, 1950.

Birmingham Post. Leading Unionist daily paper in the Midlands. It began as *The Birmingham Journal*, a weekly paper started in 1825 by John Frederick Feeney, who later, in collaboration with John Jaffray, founded *The Birmingham Daily Post* in 1857. Subsequently the name was shortened to *The Birmingham Post*. Its first editor was J. T. Bunce (*q.v.*). One of the first provincial dailies to be published at a penny, it espoused the cause of the N. in the American Civil War. Its declaration against Home Rule was one of the heaviest blows Gladstone's Irish policy received, and it was with Joseph Chamberlain in advocating tariff reform and imperial preference. The 1st Baron Iliffe (*q.v.*) became principal proprietor in 1944. Associated are *The Birmingham Mail* (evening), 1870, and *The Birmingham Weekly Post*, 1869.

Birmingham Repertory Theatre. Institution founded "to promote the cause of a living and artistic drama in and around Birmingham" in 1913. It became

one of the most important producing centres for plays, British and foreign. In 1907 a performance of *The Interlude of Youth*, from Dodsley's *Old Plays*, was given in S. Jude's mission hall. The poet-playwright John Drinkwater joined the enterprise and with the founder, Sir Barry Jackson, helped to develop *The Pilgrim Players*. The next production was of *Eager Heart*, and from 1908 to 1912 about 200 performances of 28 plays were given in the Edgbaston assembly rooms before appreciative audiences.

Enthusiasm and artistic discernment brought increasing success and recognition, which led to the launching of a professional undertaking. S. N. Cooke, a youthful architect, was commissioned to build a theatre, which was completed in four months after Cooke had visited Germany to acquire knowledge of the Reinhardt theatres. The first performance was of *Twelfth Night*. Throughout, for Shakespeare and 18th century plays, a stabilized architectural setting with varying backgrounds was the principle of stage decoration and presentation maintained.

Plays performed for the first time were by Galsworthy, Masefield, Gordon Bottomley, Drinkwater (*Abraham Lincoln*), Eden Philpotts (*The Farmer's Wife*), Rutland Boughton (*The Immortal Hour*), Shaw (*Back to Methuselah*) and Barrie. Foreign drama was represented by Chekhov (*Sierra*), Echegaray, Griboyedov (*The Misfortune of Being Clever*), Georg Kaiser (*Glas*), and Björnson. The founder introduced experimental work to other theatres, undertook tours abroad, inaugurated the Malvern Theatre Festival, and in London staged performances at the Regent, Court, Kingsway, Queen's, and other theatres. Activities were suspended shortly after the outbreak of the Second Great War and resumed with lunch-time revue in 1940. See Drinkwater, John; Jackson, Sir Barry; Malvern Festival.

Bibliography. A History of the Birmingham Repertory Theatre, Bache Matthews, 1924; Barry Jackson and the London Theatre, G. W. Bishop, 1933; *The Birmingham Repertory Theatre, the Playhouse and the Man*, T. C. Kemp, 1945.

Birnam. Village of Perthshire, Scotland. Situated on the river Tay, 15 m. N.N.W. of Perth by the railway, it is a favourite resort of tourists. The church of S. Mary is in the Early English style. A little to the S. is Birnam Hill

(1,324 ft. high), with the remains of a fortified camp where King Duncan is said to have held his court, but of the Birnam Wood referred to in Shakespeare's *Macbeth* there is no trace.

Birobidjan. Name of an autonomous Jewish region of the R.S.F.S.R., founded 1928, abolished 1951. On the Amur river in the Soviet Far East, it had an area of 14,260 sq. m., and some 10,000 Jews were settled there, the original pop. being about 40,000. The capital had the same name.

Biron, ARMAND DE GONTAUT, BARON DE (1524-92). French soldier. He took part in the battles of Saint Denis and Moncontour against the Huguenots, and was in command at La Rochelle and in Guienne. Made marshal in 1576 by Henry III, he supported Henry IV took part in the battles of Arques and Ivry against the League and was killed at the siege of Epernay, July 26, 1592.

His son, Charles de Gontaut, duc de Biron (1562-1602), served against the League, and won the name of Fulmen Galliae, or the thunderbolt of Gaul. Made admiral of France in 1592, he became a marshal in 1594, governor of Burgundy in 1595, and a duke in 1598. He was convicted of treasonable relations with Spain and Savoy, and was beheaded in the Bastille, July 31, 1602.

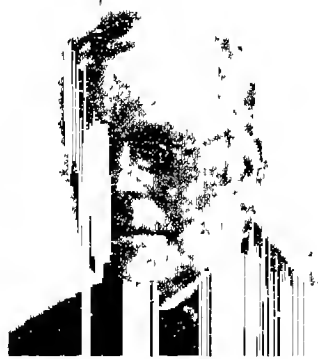
A third Biron, Armand Louis de Gontaut (1753-1794), served in America with Lafayette, and afterwards held a command in the armies of the French Revolution. He was put to death, Jan. 1, 1794.

Biron, ERNST JOHANN DE (1690-1772). Russian statesman. The son of a landed proprietor in Courland, named Bühren, he became the favourite of Anna Ivanovna, and on her accession as empress, 1730, he took the name of De Biron and was made duke of Courland. For 10 years (1730-40) he was the real ruler of Russia. He assumed the regency on the death of Anna, but a conspiracy led by Field-Marshal Münnich overthrew him after three weeks, and he was exiled to Siberia. He returned in 1741, and Catherine II restored him to the duchy of Courland. He died Sept. 28, 1772.

Birr. Urban district and market town of Offaly co., Irish republic, on the Little Brosna river, 89 m. by rly. W.S.W. of Dublin. S. Brendan's is the chief church. The town is concerned with both agriculture and manufacturing. There is a meteorological station

named from the castle which became the property of the family of Parsons, later earls of Rosse, in 1620. Pop. (1951) 3,285.

Birrell, AUGUSTINE (1850–1933). British writer and politician. Born near Liverpool, Jan. 19, 1850, son of a Nonconformist minister, he graduated in law at Trinity Hall, Cambridge, 1872. Called to the bar by the Inner Temple, 1875, he practised for a time in the chancery courts, and during 1896–99 was Quain professor of law at University College, London. In 1899 he entered parliament as Liberal member for West Fife, but lost his seat in 1900. When Campbell-Bannerman became premier in 1905, he made Birrell president of the board of Education, and at the general election of 1906 Birrell was returned for North Bristol. Chief secretary for Ireland, 1907–16, he resigned in face of criticism of his failure to foresee the Easter Rising. He did not seek re-election in 1918. He died Nov. 20, 1933.



Augustine Birrell,
British politician

Birrell's writings, especially his essays, are marked not only by knowledge and critical insight, but also by grace and humour, kindly, yet mordant. He published *Obiter Dicta*, 1884; a second series in 1887; *Res Judicatae*, 1892; *Miscellanies*, 1901; and biographies of Charlotte Brontë, 1885, Hazlitt, 1902, and Marvell, 1905.

Birstall. Former village of the West Riding of Yorkshire, incorporated in the borough of Batley in 1937. It is in the district affected by the Luddite riots of 1811–12. The machinery which provoked the local attacks was the cropping-frame, a cloth-finishing device replacing a process partly done by hand. Birstall is the original of Briarfield in Charlotte Brontë's *Shirley*; the attack on the mill in that novel was based on fact.

Birth. Act of bringing forth young or of being born. A child is born in the legal sense when every part of it has been extruded from the mother, but it is not necessary that the umbilical cord which attaches the child to the mother through the placenta should have been cut. A child is born alive if, after complete birth, it shows the smallest sign of life, even if only momentary. Where

inheritance of property or a title may turn on the birth, a muscular movement or a gasp for breath, even if the child does not respire, is sufficient to establish live birth.

In the U.K. a birth, including a still-birth after the twenty-eighth week of pregnancy, must be notified to the medical officer of health for the district within 36 hours after the birth. This obligation devolves upon the father, if he was actually residing in the house at the time, and upon any person in attendance upon the mother at the birth or within six hours after. The father may be fined if the birth is not duly notified. To conceal the birth of a child, whether born living or not, by any secret disposition of the dead body is a misdemeanour punishable by a fine, or by a term of imprisonment not exceeding two years.

The birth of every child, even if still-born, must also be registered within 42 days at the office of the local registrar of births, deaths, and marriages by father or mother or, if they are prevented by death or inability, the occupier of the house or a person present at the birth or having charge of the child. It is a criminal offence wilfully to make a false statement to the registrar. Compulsory civil registration was introduced in the U.K. in 1837 by an act of 1836; before 1837 the only registers of births were those kept by parish clerks.

Birth Certificate. Copy of an entry in a register of births certified by the person keeping the register. In the U.K. registers of all births registered in England and Wales since July 1, 1837, returns of births on British ships, in the army and air force abroad, in British registered aircraft abroad, copies of consular returns of births of citizens of the U.K. and the colonies, and certain other British subjects born abroad whose births have been registered with the consul, are kept at the general register office, Somerset House, London. Registers of births of persons born in Scotland since 1854 are kept by the registrar general for Scotland at Register House, Edinburgh. Superintendent registrars keep registers for their districts; registrars for their subdistricts.

The fee for a certified copy is 3s. 9d. Fees are also payable for searches. Certificates can be obtained at a reduced fee for certain purposes—e.g. to prove the age of a person in connexion with the Family Allowances Act, 1945. A shortened form of certificate, price

6d., is also issued: it omits any reference to the parentage of the person, or, where a person has been adopted, to the fact of adoption.

For an adopted person, a certified copy of an entry in the adopted children register is *prima facie* evidence of the date and country of birth. Such a certificate is in the name of the person after adoption, and does not show his (her) original name.

Birth Control. Term coined in 1914 by Margaret Sanger (b. 1883) for the prevention of conception by methods other than sexual continence. Some people oppose the practice as immoral and against the interest of the community; others contend that it is prudent in the interest of the individual home and of the human race, an opinion endorsed in the U.K. in the report of the royal commission on population, 1949. The usual reasons advanced in its support are: (1) civilization has made conceptions among mankind possible throughout the year and not, as with lower animals, only at certain seasons; (2) new methods of conserving infant life have lowered the infant death rate so that a far larger proportion of infants born live to reach maturity; (3) sexual intercourse is considered by some to be desirable as much for the mingling and refreshing of personalities as for procreation.

A low birth rate at any time or in any country is not necessarily due to birth control, but may be caused by a natural lowering of fertility, e.g. by malnutrition.

Birth Customs. Usages and rites attending child-birth. In primitive society they may spring from animistic speculations upon the mystery of being, or from a presumptive physiological sympathy between man and wife. Sympathetic magic accounts for the care exercised by expectant mothers to avoid the sight of a long-nosed monkey, as with Borneo Kayans, or to eat a trumpet-shell, as in Murray Island. To avert the evil eye, salt may be sprinkled (Jews), or the house-mirrors shrouded as in the Aegean islands. To placate the spirits, animals may be sacrificed (Kirghiz). The mother may place the baby in a hen-coop, and cluck to attract the baby-soul (Java). Paternal recognition may decide the fate of the newborn, especially if a girl or twins. The Kavirondo mother exposes the week-old child on the wayside; it is restored by a friendly neighbour, who acts as godmother. The first food of the infant Zeus, the

sap of the sacred ash, is still prescribed in some parts of Gaelic Scotland. At the first clothes-washing, the New Hebrides father scatters toy arrows for a boy, or mat-fibre for a girl, to ensure good fortune. A "life-tree" may be planted to grow up with the child, as among the Dyaks in Borneo, and in Switzerland.

Birth Rate. Term commonly used to mean a specific index, the crude birth rate, which is usually measured as the annual number of live births in a country per 1,000 of the country's population of both sexes and all ages. This crude birth rate is known from about 1850 for some half dozen western countries, and can be calculated from about 1950 for some 120 countries. Less commonly the term birth rate is used in contexts where the underlying interest lies in the adequacy or otherwise of the current births to ensure the nation from ultimate extinction, *i.e.* to provide replacement.

In countries of north-western Europe low birth rates of 15 to 20 live births per year per 1,000 population are in general recorded. In countries whose populations derive from European migration, *e.g.* the U.S.A., Canada, Australia, and New Zealand, successive waves of migrants have continually replenished the proportions of the population at younger ages, and slightly higher birth rates—about 25 live births per year per 1,000 population—are recorded. (In the early days of colonisation of new territory very low rates may be recorded owing to a scarcity of women.) Among non-European peoples crude birth rates are higher, generally 30–45, and rates over 50 occur in isolated years. Even higher rates may exist in countries for which vital statistics are not available.

The birth rate is depressed by low proportions of the population within the range of reproductive ages, or by a marked unbalance in the number of each sex. Mortality and migration are among factors influencing the structure of population. Using the term married to cover unions preceded by a ceremonial and unions in communities where law or custom does not require such ceremonial, a low proportion of the community married will tend to depress the birth rate. This is a situation likely to be a symptom of some deeper cause, *e.g.* unfavourable economic conditions such as existed in the western world during the early 1930s, or excessive male mortality

due to war, *e.g.* in France after the First Great War.

The fertility of marriage, that is to say the rate at which married couples build their families, clearly influences the birth rate, and is itself subject to a wide range of factors. Fecundity, *i.e.* the biological ability to reproduce, is probably the least important of these; there is no evidence of changes over the years in the level of fecundity of women of the same age despite the striking decline in fertility.

Family Limitation

More important factors are those leading married couples consciously to restrict their families. Some methods of family limitation have been known for thousands of years, for instance methods of inducing abortion. The decline in the birth rate, observed generally in Western type communities since the latter part of the 19th century, is undoubtedly attributable in the main to conscious family limitation; but the reasons for making this conscious choice are less clear. Among the probable causes may be mentioned the emancipation of women; the increasing financial liability, and decreasing financial advantage (*e.g.* with the rise in school-leaving age), of having children; greater sense of responsibility towards children; the movement among the mass of the people towards a higher standard of living; and the spread of knowledge of methods of family limitation.

The birth rate is also subject to temporary factors; for instance, in many countries the rate fell steeply in the early years of the Second Great War. A complementary rise in the birth rates of these countries was registered in the immediate post-war period.

Since the change in the total population in a country is the result of number of births, number of deaths, and the balance of migration, knowledge of the crude birth rate in a period of relative stability may make a useful contribution to estimates of short term population changes. For longer term changes, and for an understanding of the causes of change, the underlying factors must be examined, and for such purposes the crude birth rate is not a suitable medium of analysis.

Instead, the number of live births occurring in a year is related, not to the total population of all ages, but to the population of child-bearing ages. The more re-

stricted age range of mothers than of fathers, the greater ease of identifying the mother than the father of an illegitimate child, and a belief that the biological significance of the female in procreation was in some sense vital, have led to the development of analyses of births related to the number of potential mothers. (It has become evident that in western communities economic factors are more important than biological, suggesting that analysis in terms of the male—the prime wage earner—might be more useful.)

The number of live births per year per 1,000 women in the reproductive age range (variously taken as from 10 or 15 to 45 or 50)—the general fertility rate—when compared with the crude birth rate, shows clearly where the birth rate is inflated or depressed by a paucity or excess of population outside the reproductive range.

Even within the range of reproduction ages, women at different ages produce children at different rates, and a more enlightening analysis is thus provided by determining these different rates—age specific fertility rates. Still greater clarification follows the determination of the rate at which unmarried women at each age produce illegitimate children, and married women at each age produce children in the successive years of their marriage. In countries of the western type where family planning is much practised, rates of child-bearing fall rapidly with increasing duration of marriage, and are less for those marrying at older than at younger ages. Other important factors include the size of the parents' existing family and their social class.

Effects of Low Birth Rate

The protracted decline in the birth rate in the western world from the latter half of the 19th century eventually led to the propounding of the question, how low could the birth rate sink without ultimate extinction of a people? One attempt to answer this question was based on age specific female fertility rates (that is, the rate at which women of each age were currently giving birth to live female children) and consisted in calculating the number of girl babies each woman would bear in her lifetime, assuming that she lived to the end of the child-bearing period and current fertility rates continued. This rate, the gross reproduction rate, was understood to imply that if each woman was

producing more than one girl baby the group was expanding, if less than one it was on the wane.

A more realistic index of replacement, the net reproduction rate, was calculated similarly, but included an allowance for mortality from birth to motherhood, so that a net reproduction rate of unity implied that each mother would on average produce, not just one daughter, but sufficient daughters for one to survive to motherhood.

In the 1920s the net reproduction rates in most countries of north-western Europe fell to a minimum of about three-quarters of unity before a general resurgence began in the 1930s. During the Second Great War, and in the post-war period of readjustment, the rate fluctuated widely.

The calculation of the rate assumes that each woman will, at each age, bear children at the rate that children are currently being borne by women of that age, and it is patently unrealistic to assume, for instance, that for the whole of her reproductive life a woman will experience the abnormally low fertility rates experienced in England and Wales in 1941. No one would, therefore, attach any value as a prediction to the low net reproduction rates of the early war years, or to the high rates of the immediate post-war years.

Situation in 1955

By 1955 it appeared superficially that stability had been reached after the wide fluctuations of the war. The communities in most western countries were passing through a transition from low to high marriage rates. Consequently there was, at all ages within the reproductive field, an abnormal element of building new families, since family building tends to be concentrated in the early years of marriage. Thus in countries where the recovery of the net reproduction rate had barely reached unity, such as Belgium and England and Wales, it could not be considered that the population was in fact replacing itself. Several independent calculations for England and Wales, for instance, suggested that the deficiency was about 5 p.c. In countries where the net reproduction rate had risen substantially above unity, e.g. U.S.A. (white population) in 1950, 1.39, Australia in 1950, 1.36, New Zealand in 1951, 1.54, removal of distortion no doubt still left the rate adequate for replacement.

Realization of the unreliability of net reproduction rates, arising

because they are based on the fertility rates of a single calendar year and thus involve a cross section of a number of generations, has suggested the concept of generation reproduction rates. These would, as with the net reproduction rate, involve the calculation of the number of girl babies produced on average per girl baby of the previous generation, the essential difference being that the calculation would be made not for hypothetical, but for actual, generations, i.e. the actual fertility rates of advancing ages in successive calendar years are brought together in the calculation. The complete reproductive achievement of each woman is not known until she is, say, 45, but the major part of her child-bearing occurs some 20 years earlier; thus the analysis lags behind current events.

In a primitive society the birth rate is high, but a rapid growth of population is prevented by the Malthusian checks of famine and epidemic, that is to say the death rate also is high. In industrialised communities—the countries of the western world—both the birth rate and the death rate are low and again the population growth is not rapid. In achieving this position the western countries passed through a transitional phase when both birth and death rates were falling. But the death rate fell faster than the birth rate, so that during a transitional period there was a considerable excess of births over deaths, which led to a rapid growth in population.

The decline in the death rate in western countries was a result of research in medicine and public health. These discoveries were already available to the less developed countries when they began their industrial development in the second half of the 20th century; and the most vital problem for the consideration of demographers became not how to raise the birth rate in the West, but how to lower it in the East.

Birthright. Word indicating the privileges of the first-born son of a Hebrew family. These included a double portion—probably twice as much as any other son—of the father's property, and succession to the father's authority. Conditions varied in the patriarchal age, and later the law was given through Moses (Gen. 25, *vv.* 28–34; 43, *v.* 33; Deut. 21, *vv.* 15–17; 1 Chron. 5, *vv.* 1–2). The birthright precedence is accorded to Christ (Col. 1, *vv.* 15–18; Heb. 1, *v.* 6).

Biscay (Sp. Vizcaya). Maritime prov. of N. Spain. Bordering the Bay of Biscay, it lies between Guipúzcoa and Santander, in the Basque country. The coast is indented, the surface mountainous; the only river of any importance is the Nervion. The climate is variable, rainy, and uncongenial. Iron and other minerals abound; fisheries are important; cereals, flax, grapes, peaches, and other fruits are grown. The province is well served by road and rly. Some of the fiercest fighting of the Spanish Civil War took place in Biscay. Bilbao, the capital, was captured by Falangist forces on June 20, 1937, after a prolonged struggle; Guernica, razed to the ground April 27, 1937, by German aircraft supporting Franco, is also in Biscay prov. Area 836 sq. m. Pop. (1952) 578,837.

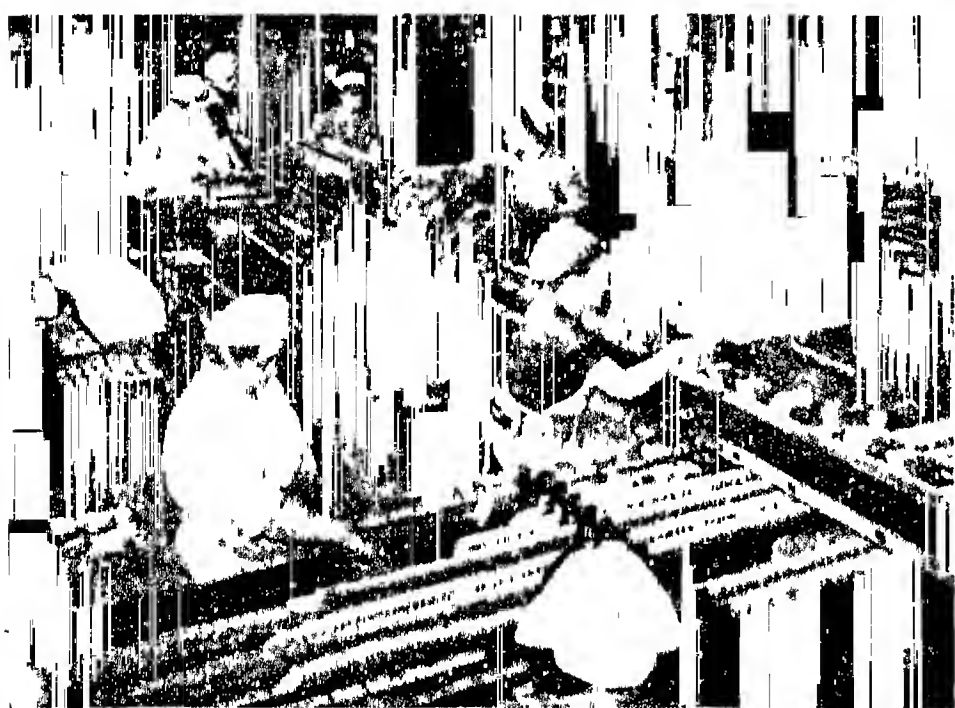
Biscay, BAY OF (anc. Sinus Aquitanicus or Sinus Cantabricus). Wide opening of the Atlantic, stretching along the coast of N. Spain and W. France. Measuring some 325 m. from Brittany to Galicia, it varies in depth from 20 to 200 fathoms. The Spanish coast is bold and rocky, but much of the French shore is low and sandy, with many lagoons. It receives the waters of the Loire, Garonne, Adour, and other French rivers; only a few unimportant rivers of Spain drain into it. When the wind is from the N.W., storms are prevalent, and the bay is apt to be extremely dangerous to navigation. It has a tidal range of up to 40 ft., one of the highest in the world.

Bisceglie (anc. Vigiñe). City and seaport of Italy, in Bari prov. It is on the Adriatic, 15 m. by rly. S.E. of Barletta. It has a 12th-century cathedral, remains of a Norman castle, fine palaces and villas. Olive oil and wine are exported. Pop. (1951) 39,101.

Bischoff. Mountain, 2,598 ft. high, in N.W. Tasmania, Australia, near Waratah. Here a solid mountain of tin, since almost worked out, was discovered in 1871, one of the richest and most peculiar reef-tin deposits in the world.

Biscuit (Lat. *bis*, twice; *coctum*, cooked). Kind of flat cake baked hard. The earliest form of biscuit was that used as a substitute for bread at sea and called ship's or captain's biscuit. It was made of wheaten flour, salt, and water only. The first domestic biscuit was the Bath Oliver, introduced in 1735 by Dr. Oliver, physician to the Bath mineral water hospital. Several hundred different varieties of biscuit have since been

introduced, including such standard kinds as Osborne, Petit Beurre, Marie. In the making of biscuits sweetening, spice, flavouring, butter milk, eggs, and many kinds of flour are used. Factory production of biscuits is elaborately mechanised. The dry ingredients are carefully weighed and dropped through a chute directly into a mixer on the floor



Biscuit Upper picture, miles of biscuits being conveyed to the gas oven. Lower, girls in a packing department
Photo, British Official, Crown copyright reserved

below. The correct amount of water or other liquid then flows down to the mixer. When mixing is complete, the dough is ejected and travels on a moving canvas band beneath a series of rollers which reduce it to the required thickness. It then passes to the cutters, which chop it into biscuit form and impress on each piece of dough the name of the biscuit and its maker. "Cuttings" not used in this process are passed back to be rolled in with the next mixing.

The shapes thus formed travel forward on a canvas band and are transferred to an endless wire mesh band which passes through a gas oven 200 ft. or more long. When the band emerges, the biscuits are perfectly baked and are automatically removed and transferred to canvas travelling conveyors which take them to the packing rooms.

In the U.S.A. the term biscuit is applied to what in the U.K. is called a scone.

Biscuit Ware. Term applied to fired, unglazed pottery; also to a

fine pipe-clay ware, imitating china. See Pottery.

Bisharin. Nomad tribe of Hamitic stock living in the Nubian desert between the Nile and the Red Sea. They are located between the Ababda and the Hadendoa tribes, are dark, lithe, and shaggy haired, and wear leather aprons and blankets (*melaya*).

They graze sheep and camels on the scattered uplands, and collect senna leaves for trading. They have a permanent settlement at Assuan. See Beja.

Bishnupur. Town of Bengal, India. The ancient capital (Vishnapura) of Bankura district, 79 m. N.W. of Calcutta, it has many temples, mosques, and remains of antiquity. It makes silk, cotton, and carved stone ware. Pop. 18,000.

Bishop (Gr. *episkopos*, overseer; A.S. *biscop*). An official of the Christian Church. The word, derived from the oldest Greek translation of the O.T., means generally a superintendent, civil or religious, and was at first used interchangeably with presbyter or elder. Bishops exist in the Roman Catholic and Anglican Churches all over the world, as well as in the Methodist Episcopal Church of America, the Moravian Church, among the Lutherans of Scandinavia, and in Eastern Churches.

In England a bishop of the Established (Anglican) Church is

the spiritual overseer of a district or diocese, with his see or chair in the principal church in that district. He takes his title from the town or city in which that church is situated, has power to administer confirmation and ordination, and to consecrate other bishops, churches, churchyards, and memorials. His relation to his cathedral is governed by the statutes of that cathedral. He has a consistory court, with chancellor and registrar (who are qualified lawyers), archdeacons, and chaplains. The insignia of office commonly include ring, gloves, crosier, and mitre.

His appointment is recommended to the sovereign by the prime minister, and royal permission, called *congé d'élire*, is issued to the dean and chapter of the vacant diocese to elect him. If in the House of Lords, a bishop takes precedence, as a lord spiritual, above the barons and below the viscounts. His wife does not rank as a peeress. He signs his name by his first name and his title, sometimes using the Latin name of the see. There are now 43 diocesan bishops, including the two archbishops, in England; 24 of them sit in the House of Lords. The archbishops of Canterbury and York, and the bishops of London, Durham, and Winchester always sit, the others (except Sodor and Man) by seniority of appointment.

In the early centuries bishops were appointed by clergy and laity, subject to the veto of the other bishops of the province, as they are in the episcopal church of Scotland to day; then by emperor or king in conjunction with the cathedral chapters, subject to the confirmation of Rome. In the time of Henry VIII it was laid down that their election belonged only to the Church and Crown of England. British subjects, as well as subjects or citizens of foreign countries, may be consecrated by the archbishops of Canterbury or York to be bishops in foreign countries, with jurisdiction over British Anglican congregations, or such Protestant congregations



Bishop. Dr. Wand, bishop of London, in his vestments

as may desire to place themselves under their authority. The diocese of a bishop is called a bishopric. Sometimes it is called a see (Lat. *sedes*, a seat), a word more properly applied to a bishop's chair in the chief church of his diocese.

In addition to these diocesan bishops, as they are called, there are in the Church of England bishops designated bishops suffragan. They are consecrated for auxiliary service in the larger dioceses the size of which precludes adequate supervision on the part of the diocesan bishop, and take office under an Act of Henry VIII, which was revived and amended in 1888. There are 28 bishops suffragan in the province of Canterbury, of whom London has four; and 13 in the province of York. Bishops suffragan use their territorial title as signature.

Of Roman Catholics there are 14 bishops in England and Wales (excluding four archbishops), and six in Scotland (excluding two archbishops). In the Anglican Church in Wales, bishops are elected by an electoral college; and in Ireland by the diocesan synod, or failing that, by the House of Bishops. See Anglicanism; Church of England; Diocese; Episcopacy; Roman Catholic Church.

Bishop, EDMUND (1846-1917). English Roman Catholic writer. Born at Totnes, May 17, 1846, and educated at Exeter and in Belgium, he served in the Education Department 1864-85. Received into the Roman Catholic Church, 1867, he collaborated with Cardinal Gasquet in the study of liturgical documents, and in the publication of Edward VI and the Book of Common Prayer, 1890. His writings include *The Genius of the Roman Rite*, 1899. He died Feb. 19, 1917.

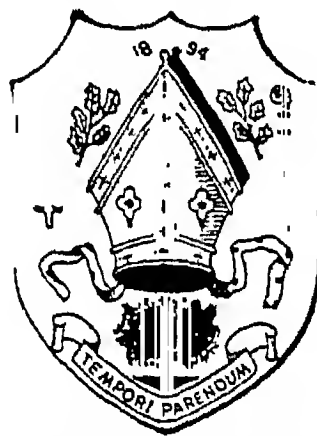
Bishop, SIR HENRY ROWLEY (1786-1855). British composer. Born in London, Nov. 18, 1786, he had an opera produced when he was 18. An original member of the Philharmonic Society founded in 1813, he took his turn as conductor. He became composer and director of music at Covent Garden, the King's Theatre, Haymarket, and at Vauxhall. He was knighted in 1842 and died in London April 30, 1855. He is remembered for his setting of the song *Home, Sweet Home*. He composed many operas which have been forgotten.

Bishop, ISABELLA (1832-1904). British traveller and writer. Born Oct. 15, 1832, she was the daughter of an Anglican clergyman, Edward

Bird. For reasons of health she began to travel about 1854, and her journeys in America gave the opportunity for her first book, *The Englishwoman in America*, 1856.

Her most adventurous journeys were made in Asia from 1878. Her series of books on Asia made her known as an intrepid explorer; they include *Unbeaten Tracks in Japan*, 1880; *Journeys in Persia and Kurdistan*, 1891; and *Korea and Her Neighbours*, 1898. At the age of 68 she explored Morocco and made long journeys in the Atlas Mountains. In 1881 Miss Bird married John Bishop, M.D., of Edinburgh. She was a firm believer in medical missions, and founded hospitals in India and China. She was the first lady fellow of the Royal Geographical Society. She died at Edinburgh, Oct. 7, 1904. Consult *Life*, A. M. Stoddart, 1906.

Bishop Auckland. Urban district and market town of Durham, England. At the confluence of the



Bishop Auckland arms

rivers Wear and Gaunless, it is 11 m. S.W. of Durham, on the railway. Auckland Castle, the palace of the bishops of Durham, founded by Bishop Anthony Bek about 1300, is a large, splendid pile, covering five acres, and surrounded by a park of 800 acres. The centre of a mining district, the town has also engineering works. The town hall, 1863, is a handsome building, with lofty spire. Bishop Auckland gives its name to a county constituency. Market days, Thurs. and Sat. The urban area was extended in 1937 to take in several villages. Pop. (1951) 36,350.



Bishop Auckland. Palace of the bishops of Durham, founded about 1300, when the present chapel was built, and partly reconstructed in the 16th century



Isabella Bishop,
British author
Elliott & Fry

Bishopbriggs. A village of Lanarkshire, Scotland. It is 3 m. N.E. of Glasgow, of which it is a suburb, and has a railway station. Pop. 5,392.

Bishop's Castle. Mun. bor. and market town of Shropshire, England, 22 m. S.W. of Shrewsbury. It was formerly the terminus of a private rly., dismantled 1935, from Craven Arms. It received its name as the outlying castle of the bishops of Hereford. Market day, Fri. Pop. (1951) 1,291.

Bishopsgate. London thoroughfare, formerly divided into Bishopsgate Street Within and Bishopsgate Street Without, i.e. inside and outside the old city walls. It runs N. from Gracechurch Street and proceeds across the E. side of Liverpool Street station. Near the house at the S.E. corner of Bishopsgate Street Without was the old gate, named after Bishop Erkenwald, who is believed to have built it. It was several times rebuilt, last in 1731, and was pulled down in 1760. The street contains the church of S. Helen's, famous for its monuments, including the tomb of Sir Thomas Gresham, founder of the Royal Exchange. Crosby Hall (*q.v.*), which housed Richard III, after becoming a restaurant in the 19th century was moved to Chelsea in 1910.

Bishop's Ring. Dusky, reddish ring of about 20" radius, which, for a long time after the famous 1883 eruption of Krakatoa, volcanic island between Java and Sumatra, surrounded the sun even at noon on clear days. It is named after George Bishop, who first observed it at Honolulu. The phenomenon, as well as the brilliant sunset and sunrise glows of the years 1883-5, was due to the presence of minute particles of dust blown from the volcano and circulated throughout the whole atmosphere. It was last seen in June, 1886. Similar rings were observed in 1902, after the disastrous eruption of Mont Pelée, in the island of Martinique, West Indies. See Krakatoa; Volcano.

Bishop's Stortford. Urban district and market town of Hertfordshire, England. On the river Stort, it is 14 m. N.E. of Hertford, on the railway. It has a college for boys, a high school, a girls' school, and convent school. It trades in grain, malt, brick, and lime. Of Saxon foundation, it was granted by William I to the bishop of London. The birth-place of Cecil Rhodes now forms a Rhodes museum. Market day, Thurs. Pop. (1951) 12,772.

Bishop's Waltham. Parish and market town of Hampshire, England, 9 m. S.E. of Winchester. The ancient palace, now in ruins, erected by Henry of Blois, bishop of Winchester, was the scene of the death in 1404 of William of Wykeham. Pop. (1951) 2,883.

Bishop Wearmouth. District in Sunderland, England. Originally it was a settlement on the south bank of the Wear, the land belonging to the bishop of Durham, to whom it was granted in 930. It became a shipping and a fishing centre but about 1600 was merged in Sunderland (*q.v.*).

Bishopweed (*Aegopodium podagraria*). Perennial herb of the family Umbelliferae a native of

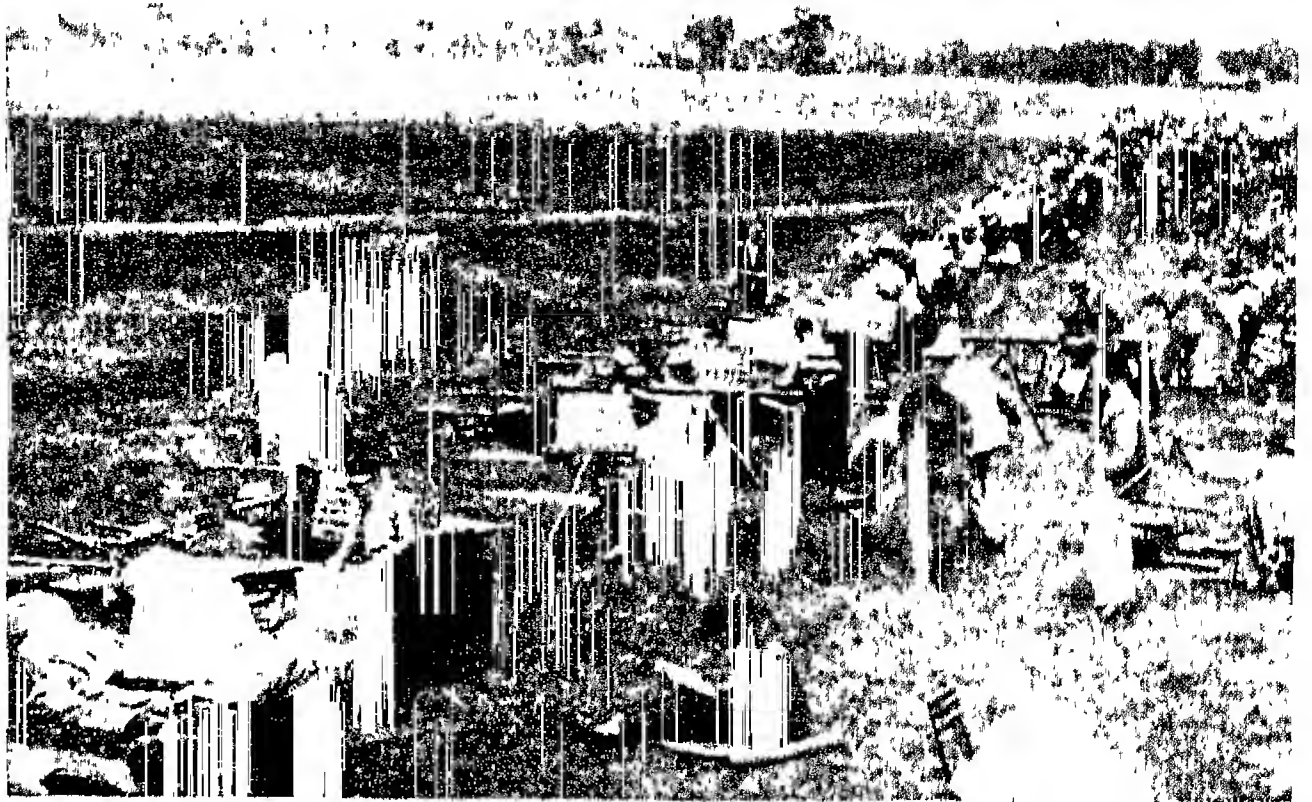


Bishopweed flowers and leaves

Europe and W. Asia. Its root-stock is white and creeps rapidly and extensively underground. The leaves are wedge-shaped and divided into three groups of three leaflets. The flowers are small and white, in compound umbels. It was once largely cultivated as a supposed remedy for gout. Other names are goutweed, ashweed, and English masterwort.

Biskra. Town, health resort, and oasis in Algeria, the *Ad Piscinam* of the Romans. It lies in a valley of the Aures Mts., alt. 360 ft., at the head of caravan routes, 140 m. by rly. S.W. of Constantine. It is noted for its date-palm and olive trees and has hot sulphur baths. The fort contains the hospital, government offices, and barracks, and the modern French town has a casino, hotels, shops, and clubs. Burnous and carpets are made. It was important under the Moors. In 1844 it was taken by the French. It suffered severely from the plague in 1863. Pop. 9,000.

Bisley. Village near Woking, Surrey, and 1½ m. N. of Brookwood station, on the electric rly. from



Bisley. Members of the National Rifle Association shooting on the Century range during a competition for the Kolapore Cup

Waterloo. Pop. 955. Bisley has given its name to the famous camp, home of the National Rifle Association and grand centre of competition shooting for the British Empire.

The longest range is Stickle-down, on which there are fifty targets with firing points going back to 1,200 yds. The shortest range is just behind Club Row, where are the homes of many great shooting institutions, and is for revolver shooting at 20 yds. Next to this are the Shorts at 200 yds. The Century range has a hundred targets and firing points at 100, 200, 300, and up to 600 yds., where are shot the majority of the great team and individual competitions, including the preliminary stages of the King's Prize, the most important event of the national rifle shooting festival which is held in the first fortnight in July.

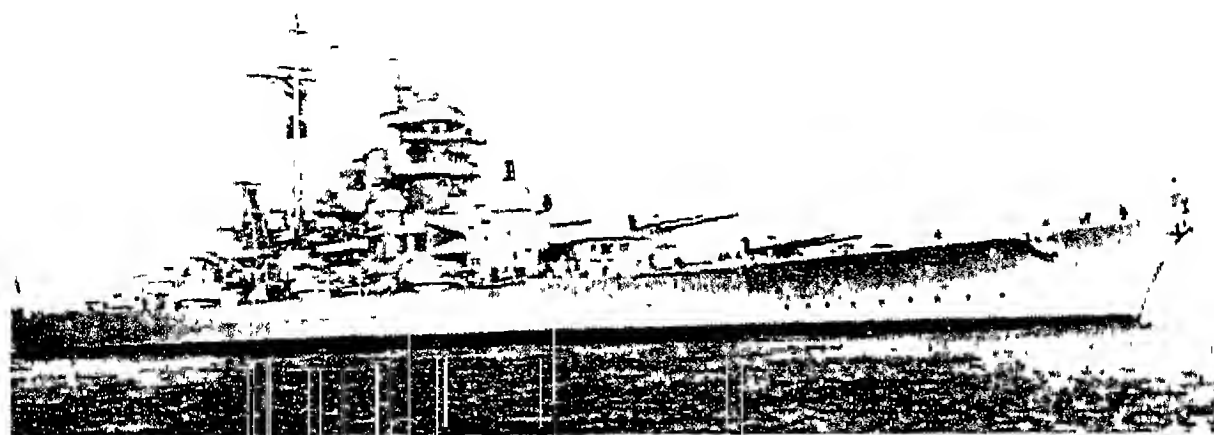
The Royal Navy, the Royal Marines, the Army, and the Royal Air Force hold special weeks of their own, many Regular and Territorial Army units shoot there, and club competitions are held during most week-ends in summer.

The National Rifle Association moved from Wimbledon to Bisley in 1890, and the permanent ranges are a national asset. Though the N.R.A. does not set out to teach shooting, instruction is given by old hands to beginners at the clubs. During the First Great War the N.R.A. started a school of musketry with most of its older crack shots as instructors to the new armies. Between Aug., 1914, and Dec., 1918, nearly 5,000 officers and 10,000 n.e.o.s were successful in the examination.

After that war the official shooting school at Hythe, Kent, was moved to the Bisley ranges for a brief period. During the inter-war years the N.R.A. held successful meetings, but had to strive against a lack of interest in the sport.

From the inception of the L.D.V. (later Home Guard) Bisley became a great centre of instruction for the regiments situated in London and the home counties. In 1940 a sniping school was started under the auspices of Hythe and with officer and n.e.o. instructors who were well-known Bisley experts. In the same year the Hythe ranges came under enemy fire and the small arms school removed from Hythe to Bisley, where it remained until 1946.

Bismarck. German battleship. Launched 1939, she was of 56,200 tons displacement, carried eight 15-in., twelve 5.9 in., and sixteen 4.1-in. guns. Her commander was Admiral Luetjens. On May 22, 1941, aircraft reported that the Bismarck, previously located at Bergen, had sailed from that port with the cruiser Prinz Eugen. The next day she was sighted by the cruisers Norfolk and Suffolk and shadowed throughout the night. On May 24 the battleships Hood and Prince of Wales joined action with the Bismarck W. of Iceland; the Hood was sunk, the Prince of Wales damaged, and the Bismarck escaped S.W., with 50 British ships after her. Spotted from the air, hit by a torpedo from a Swordfish of H.M.S. Ark Royal, she was halted about 550 m. W. of Land's End. Shadowed by the cruiser Sheffield, then attacked by the destroyers Cossack



Bismarck. View of the 56,200-ton German battleship which was sunk by the British cruiser Dorsetshire on May 27, 1941

and Maori, as well as a Polish destroyer, the Bismarck, heavily crippled, crept towards Brest, but was sunk by a torpedo from the cruiser Dorsetshire on May 27.

Bismarck. City of North Dakota, U.S.A. Capital of the state and the co. seat of Burleigh co., it stands on the Missouri river, and is served by many rlys. It has a court house, state library, and capitol. Coal, grain, and hides are extensively traded in, and the city has grain elevators and manufactures of flour, twine, and foundry products. A few miles outside the city is Fort Lincoln, a U.S. army post. Settled in 1873, Bismarck became the capital of Dakota Territory in 1883 and of North Dakota in 1889. Pop. (1950) 18,640.

Bismarck, OTTO EDUARD LEOPOLD PRINZ VON BISMARCK-SCHÖNHAUSEN (1815-98). German chancellor.

He was born April 1, 1815, at Schönhausen on the lower Elbe, near Stendal.

The founder of modern Germany was the scion of a poor but ancestral line of Brandenburg

Junkers. That he had inherited their fighting instinct was shown by his 28 victorious student-duels at the university of Göttingen. His academic career was succeeded by a few years of training for administration in the Prussian state, and then by a further spell of country life. But Bismarck's first fighting was of the political kind—his arena being the various parliamentary assemblies which ended, in 1848, in the granting of a Prussian constitution, of which he was ever the fierce opponent. A royalist to the core, he prompted Frederick William IV to decline the imperial crown offered him by the Frankfort parliament of 1849, for the reason that the tender

was based on popular will, and not on the concurrent assent of the German sovereigns.

At Frankfort from 1851, as Prussian member of the resuscitated Bund or Diet, which represented all the German sovereigns, but left their peoples entirely out of account, Bismarck became the dominating figure. He had been quick to see that the German question could never be settled as long as retrograde Austria blocked the way with her claims to hegemony, and he determined that this leadership should pass to Prussia. His dispatches during eight years, when published, were seen to be masterpieces of style, historical learning, character-sketching, and political insight. In 1859 he was sent to St. Petersburg to study the Russians which he did profoundly; then in 1862 he spent a few months in Paris, probing the mind of Louis Napoleon, to be recalled to Berlin as minister-president or premier, a position he held for 28 strenuous years of constructive labour.

Bismarck declared: "It is not by speechifying and majorities that the great questions of the time will have to be decided—that was the mistake made in '48 and '49—but by blood and iron." Henceforth he became the historic "man of blood and iron," and as such his first act was to tell the Prussian chamber that if it refused to grant supplies for the reorganization of the army, he would have to get them otherwise, by dispensing with a budget. He then proceeded to engineer a war against Denmark (1864), which he once avowed to be his "diplomatic masterpiece." With the help of Austria he deprived Denmark of her Elbe duchies (Slesvig and Holstein), after which he picked a quarrel with Austria. This resulted in that power being crushed at Königgrätz (1866), and expelled from the Germanic family of nations, leaving Prussia—now aggrandised by her annexation of the Elbe duchies of Hanover and

Hesse-Cassel—the leading power in Germany with the Southern States bound to her by secret military treaties of assistance in the event of a war with France. At the same time he formed a new Confederation of North Germany.

War with France was not long in coming—only four years, and it was inevitable. Bismarck himself believed it to be so, and claimed that all he did by his doctoring of the famous Ems telegram was to accelerate or precipitate hostilities in the interest of Germany. That conflict culminated in a scene of intense dramatic interest and splendour when Bismarck read to the assembled princes, Jan. 18, 1871, on the 170th anniversary of the founding of the Prussian monarchy, a paper proclaiming the new German Empire, with his master, William I, as Kaiser.

Bismarck, now a prince, set himself to the task of consolidating Germany. He met with hostility from the Church of Rome and the Socialists. He combated the revolutionary aims of the latter by a twofold policy of repression and reform—the latter including the adoption of a trade protectionist system which soon began to make Germany an industrial as well as an agricultural state, while his numerous economic measures—including insurance of the working classes against accidents, indigence, and old age caused him to be regarded as the greatest state socialist of his time. In foreign policy his aim was to isolate France. He was now the oracle of Europe and the culmination of his power and influence may be said to have been reached when, in 1878 he presided as "honest broker" over the Berlin Congress which was called to adjust the results of the Russo-Turkish War. Then came the defensive alliance between Germany and Austria which by the adhesion of Italy in 1882, developed into the Triple Alliance. His colonial policy from 1884 brought Bismarck into diplomatic collision with England.

To the end of his career the Triple Alliance, combined with a good understanding with Russia were the cardinal principles of his policy. But the latter of those principles was repudiated by William II, who in 1890 "dropped the pilot" by dismissing Bismarck. There was a pretence of reconciliation between the two, but the heart of the Iron Chancellor had been broken. On July 30, 1898, he died at Friedrichsruh, near Ham-



Otto von Bismarck

burg, an estate presented to him by the old emperor. William II's offer of a public funeral and a tomb in Berlin cathedral was refused.

His elder son, Herbert Nikolaus von Bismarck (1849-1904), having fought in the war against France, became a diplomat, and was ambassador to Russia 1884, and foreign secretary 1886-90. His name was known in England chiefly for the part he took in arranging the treaty of 1885 between England and Germany concerning the boundaries of the African colonies. He was a member of the Reichstag from 1893 until his death, Sept. 18, 1904.

Bibliography. The Founding of the German Empire, H. C. L. von Sybel, Eng. trans. 1890-91; Autobiography, Eng. trans. 1898; Lives, C. Lowe, 1898; Emil Ludwig, 1930; I. Morrow, 1943; A. S. P. Taylor, 1955.

Bismarck Archipelago. A group of islands in the Pacific, lying off the E. coast of New Guinea, acquired and so named by Germany in 1884-85. In 1914 an Australian naval and military force captured the islands from Germany. They were administered by Australia under League of Nations mandate from 1921, under United Nations trusteeship from 1946. The largest

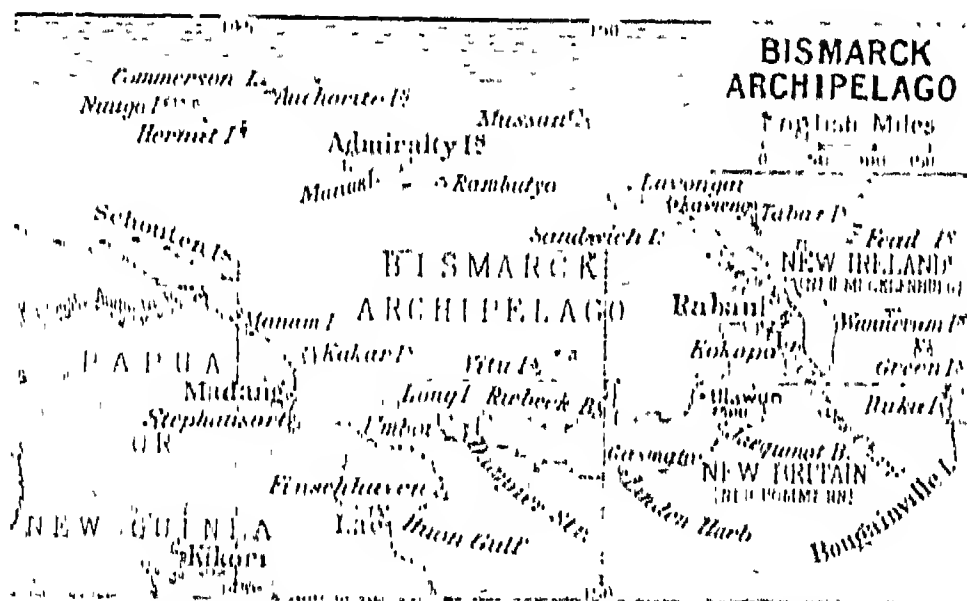
of this group of islands is New Britain (formerly Neu Pommern); others are New Ireland (Neu Mecklenburg), Duke of York Islands (Neu Lanenburg), and Lavongai, with the Admiralty, Anchorite, Commerson, and Hermit Isles. Total area about 23,500 sq. m.

Of coral or volcanic formation, the islands are generally mountainous, some having peaks rising to 7,500 ft. They are well wooded, have a warm, humid climate, and produce copra, coconut fibre, cotton, coffee, rubber, fruit, vegetables, tortoiseshell, trepang, and mother-of-pearl. The inhabitants are mostly Papuans, and are good agriculturists. They are still inclined to cannibalism. There are Methodist missions in the islands. Kokopo, superseded as capital by Rabaul in 1910, again became the centre of administration 1947-50, Rabaul having been destroyed during the Second Great War.

The Japanese twice raided Rabaul airfield from the air on

January 4, 1942. Bombing attacks on Rabaul and Kavieng continued at intervals until Jan. 23, when the Japanese landed at both places, occupying both islands by the end of Feb. Thereafter Rabaul harbour and airfield were bombed repeatedly by the R.A.A.F. During April 2-4, 1943, U.S. aircraft sank or severely damaged 12 vessels in convoy off Kavieng. During Feb. 15 and 16, 1944, a Japanese convoy of 15 vessels was wiped out by Allied bombers when approaching the Bismarck Archipelago. The fighting that followed the Allied return to New Britain on Dec. 15, 1943, is described in the entry on that island. The Japanese were not cleared from the archipelago until after the surrender of Japan in Aug., 1945.

Bismarckburg. Town of Togoland, Africa. It lies in territory under French trusteeship, near the British frontier and the Azuokoko



Bismarck Archipelago. Group of islands in the Pacific Ocean; they are largely inhabited by Papuans

river. The town at the S. end of Lake Tanganyika, formerly called by this name, was renamed Kasanga (q.v.)

Bismarck Sea, BATTLE OF THE. Military engagement of the Second Great War. It was fought at sea between New Guinea and the Bismarck Archipelago during March 1-4, 1943. A naval victory won by air power directed by an army general, it opened March 1 when Allied reconnaissance aircraft observed a Japanese convoy of three cruisers, four destroyers, and seven transports and cargo ships with air escort sailing southward west of New Britain. Next day eighteen more transports joined the convoy, which was repeatedly attacked by U.S. Fortresses and Liberators, at least nine ships being sunk. On March 3 all available U.S. and Australian aircraft joined in the battle, going in to attack at mast-head height. On the 4th General MacArthur's G.H.Q. announced that all the ships in the convoy

had sunk or were sinking; by the end of the day not one remained afloat. Fifty-five Japanese aircraft had been shot down, and ground forces estimated at 15,000 had been killed. Allied losses were one bomber and three fighters.

Bismon. Colloidal oxide of bismuth used in stomach and bowel troubles of children. It is prepared by acting on bismuth albuminate with caustic soda solution and dialysing the product.

Bismuth. Metal, chemically an element, having an atomic or combining weight of 209, specific gravity at 12° C. (53.6° F.) 9.823, melting-point 271° C. (507.2° F.), and boiling-point between 1,090° and 1,450° C. (1,994°-2,645° F.). Its chemical symbol is Bi; atomic number 83.

The metal is greyish white in colour with a reddish tinge; crystalline, very lustrous, brittle, and easily reduced to powder. It is a bad conductor alike of heat and of electricity, and has a very low tensile strength. It expands on cooling from the liquid to the solid state. It is not affected by air if the air is dry, but takes on a coating of oxide in moist air. It burns in air with a bluish flame; at a high temperature decomposes water; and, while not affected by cold sulphuric acid, is dissolved by hot and also by other acids, forming nitrates with nitric acid.

Bismuth appears to have been first recognized as a metallic body in the 15th century by Basil Valentine, who gave it the name wismut. Agricola in 1546 referred to it as a metal different from but suggestive of lead. But the first accurate account of its chief properties was given by Torbern Bergman, professor at Uppsala, in the latter part of the 18th century.

Native bismuth is the main source of the metal, but it is usually associated with other metals, chiefly cobalt, copper, nickel, lead, tin, silver, gold, and antimony. Bolivia is the main producer, but important ores are found in Spain, Saxony, Australia, the U.S.A., etc. Other ores often found in the same localities are the normal sulphide, bismuthine or bismuth glance; the oxide, bismite or bismuth ochre; oxychlorides, tellurides, carbonates, and many complex compounds. The pure metal was at one time extracted by liquation, but this method is not efficient. The modern dry method involves smelting the ore, mixed with fluxes to remove the unwanted matter, in a reverberatory

furnace: any bismuth present as compounds is also separated in this way. The modern wet method, which is based on the precipitation of bismuth oxychloride from a hydrochloric acid solution, is particularly suited to the treatment of by-products.

Many alloys of bismuth are used for stereotype plates and delicate castings, such as dental dies from plaster impressions. In another important group of alloys, bismuth has the effect of depressing the melting point. Typical of these fusible alloys are Wood's metal melting at 71°C . and Rose's alloy melting at 100°C . They are used for fuses in various safety devices, *e.g.* the sprinkler valve—an appliance for fire protection—the fuse for electric kettles, and for filling thin-walled tubing during bending, sealing glass joints, etc.

Bismuth carbonate, $2(\text{BiO})_2\text{CO}_3 \cdot \text{H}_2\text{O}$, is obtained by precipitating a solution of bismuth nitrate with ammonium carbonate. It is a white powder insoluble in water and is given internally to relieve indigestion. Bismuth citrate and bismuth naphtholate are similarly used. Of oxides the best known is the trioxide, Bi_2O_3 , obtained by igniting the basic carbonate or nitrate; this gives a white glaze on some porcelains

drug used to destroy spirochaetes in the human body. Other bismuth compounds are used in medicine; bismuth subnitrate, $\text{Bi}(\text{OH})_2\text{NO}_3$, discovered by Libavius (1540-1616), is still used medicinally for diarrhoea and cholera. A colloidal solution of bismuth is formed by reducing the oxychloride with hypophosphorous acid.

About 33 p.c. of the world's production of bismuth is used as compounds in pharmaceutical preparations; most of the rest is used metallurgically. Small amounts are used in enamelling and in the manufacture of optical glass.

Bison. Name given to a small group of the ox family, comprising only two species, the European and the American bison. They are distinguished from other members of the family by the low position of the horns, the rounded forehead, and the much greater height of the forequarters as compared with the hind ones. The hump on the shoulders is caused by the exceptional length of the spines of the backbone. A distinctive feature is the great mane that covers the back of the head, neck, and shoulders, giving the animal an appearance of extraordinary massiveness in front. This, however, is part of its winter coat and falls off in patches during the summer, when the skin appears

almost bare in places and the bison has a very ragged and dilapidated appearance. Another characteristic feature is the heavy beard under the chin.

The European bison possesses these features in a less marked degree than its American cousin. It is really the taller of the two, though it looks shorter owing to the smaller development of the

mane. Its hindquarters are also more massively built, but on the whole the American species is the heavier of the two.

In former times the bison ranged over a large part of Europe, and its fossil remains are found in the Thames valley. At the present time it only lingers under government protection in the forests of Lithuania and the Caucasus, where it feeds mainly on the leaves and bark of the trees. Though shy animals as a rule and difficult to approach, the bulls are very dangerous in the mating season.

The American bison formerly roamed the prairies in vast herds, one of which was estimated at about 4,000,000 individuals, and covered an area of 50 m. by 25 m. But the destruction of the animal for its hide brought it to the verge of extinction, until only a few score were left. It is now strictly protected by the American government, and the few herds preserved in the national parks are increasing in numbers. This bison, often erroneously called the buffalo, breeds well in captivity.

Bison. A French destroyer of 2,436 tons. She was sunk by German bombers in the North Sea, May 6, 1940, the first French warship to be lost by enemy action in the Second Great War, while conveying Allied troops from Norway.

Bisque. French term, of unknown origin, for the odds given to an inferior opponent in tennis, lawn tennis, croquet, and golf. In tennis and lawn tennis the bisque consists of a point which may be claimed at certain stages of a game; in croquet it implies an extra stroke allowed to the weaker side; and in golf, a handicap stroke permitted to the receiver at any hole during the match. In *bélique* a bisque is an ace or ten, for which points may be scored during or after play of the hand.

The term has been introduced into the civil service and elsewhere for a holiday which an employee may take on any day he pleases.

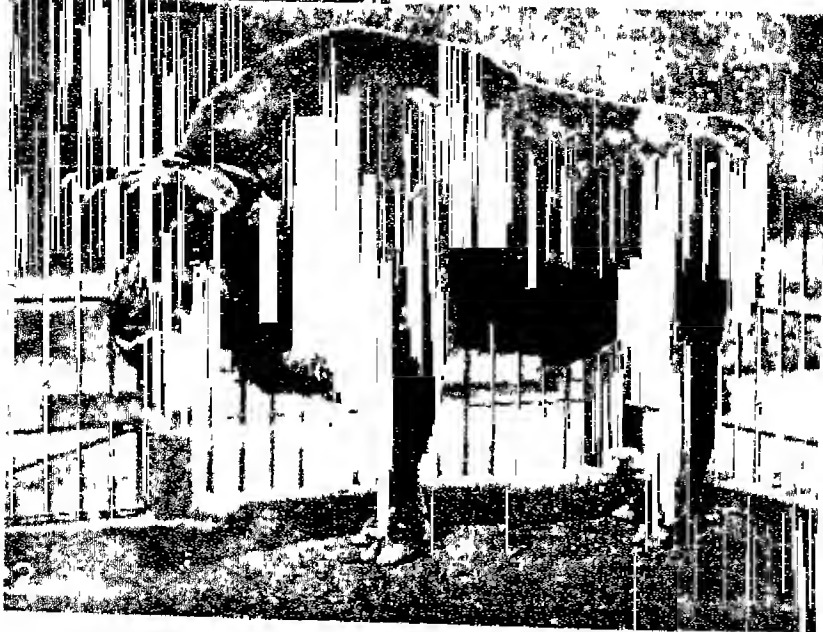
Bisque also means a thick soup, especially one made of crayfish or other shellfish, or of pigeons, quails, or other birds. As a form of the word biscuit, the term is applied to pottery or stoneware after the first firing and before glazing, and to unglazed porcelain.

Bissagos OR BIJUGA. Group of 16 large and many small sandy islands off Portuguese Guinea, W. Africa, opposite the Geba estuary. The climate is unhealthy. The inhabitants are a wild negro race. Products include rice, fruit, and



and is used in stained glass. When bismuth trioxide is treated with an alkaline solution of potassium ferricyanide, a brown powder of bismuth tetroxide, Bi_2O_4 , is formed. If chlorine is passed into a suspension of bismuth trioxide in very hot caustic potash, a scarlet powder of bismuth pentoxide, Bi_2O_5 , is formed.

Bismuth oxychloride, BiOCl , is a valuable



Bison. 1, American bison, Zool. Gardens, San Francisco. 2, European bison, which sheds its mane
Gambier Bolton, F.Z.S.

cattle. The largest of the islands, Orango, Bolama, Gallinhas, etc., containing many good harbours, are administered by Portugal. The chief town is Bolama.

Bissao OR BISSEO. Seaport and fortified town of Bissao Island, and since 1942 the capital of Portuguese Guinea, W. Africa. It stands on the Geba estuary and has a large trade in hides, wax, and rice.

Bissextile (Latin *bis*, twice; *sextus*, sixth). Word meaning leap year, and formerly used as a name for it. This was due to the fact that in the Julian calendar the extra day now represented by Feb. 29 was obtained by counting Feb. 24, which was the sixth day before the calends of March, twice over. See Calendar.

Bissolati, LEONIDA (1857-1920). Italian politician. He was born at Cremona, and after a distinguished career at the university of Pavia became a lawyer. Attracted to journalism, he became editor of *Avanti*, a socialist journal, and the author of many works of socialist propaganda. For many years a deputy to the Italian parliament, he became political commissioner for war services in 1916. In the Orlando cabinet formed in 1917 he became minister of public assistance and pensions. He resigned in Dec., 1918, and died in May, 1920.

Bistre (Fr.). Brown pigment used in water-colour painting. It is prepared from the soot of beech wood, which is treated with water to remove any soluble matter. The residue is dried, mixed with gum water, and made into cakes. The colour is durable, but tends to absorb moisture from the atmosphere.

Bistrita (Ger. Bistritz; Hung. Beszterce). Town of Rumania, formerly a royal free town of Hungary, and capital of the co. of Nasaud. It lies in the valley of the Bistrita, 50 m. N.E. of Cluj. It has saw-mills and tanneries, and was once an important commercial town. Pop. 13,251.

Bistrita. River of Rumania. Rising in the Carpathian Mts., it flows 185 m. through Bukowina and Moldavia, and joins the Seret near Bacau. From its gold-bearing sands it is known as the Golden Bistrita.

Bit. Mouthpiece of a bridle, carried by the horse in its mouth so that the driver may cause it to obey his will. It is usually of metal and both the cheek straps and the reins are attached to it. A curb-bit has a curb chain instead of a bar and gives the driver a very strong leverage by enabling him to com-

press the horse's mouth. A snaffle bit is joined in the centre, and is usually provided with cheek pieces so that the reins may not slip into the horse's mouth.

Bit. Detachable portion of a boring or cutting tool. Wood-boring bits are used in the chuck of a carpenter's brace. The twist-bit, used for deep holes, is formed with a long shank, the lower part of which is spirally fluted to bring up the cuttings as the bit enters. At the cutting end there are two nickers, or scribing cutters, connected to the screw-nose by two routers which remove wood from the hole. The routers, chisel-shaped at their cutting edge, merge into the spiral of the shank. The nose is formed with a taper worm to draw the bit into the wood as the brace is rotated.

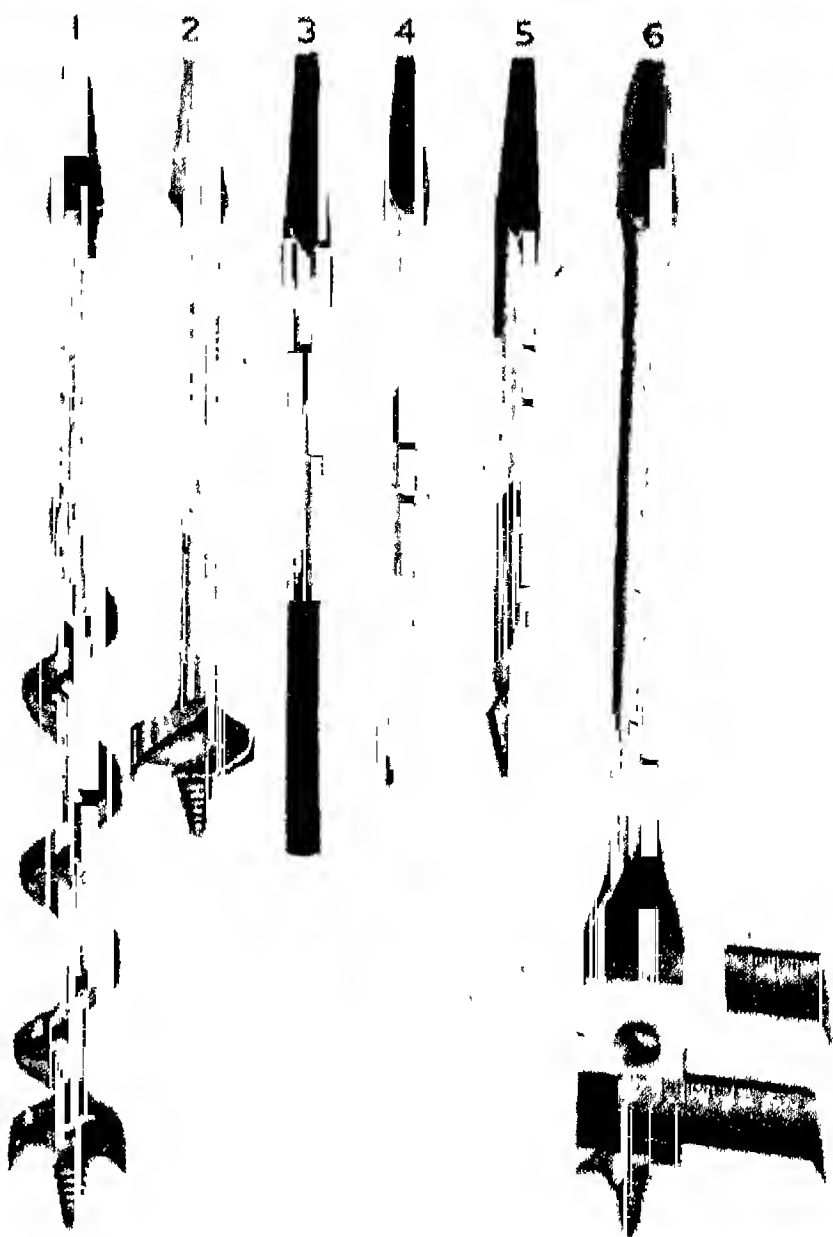
The centre bit is used for shallow holes, as the narrowed shank behind the cutting part gives no guidance after the bit has entered a little way into the wood. Both these bits are made for fairly large-

diameter holes, up to 1 in. For smaller holes (*i.e.* to take screws), nose bits, shell bits, or gimlet bits are used. Holes up to 3 in. diameter or more can be bored with an expanding bit, which has a router

blade adjustable in a groove to give different radii from the screw-nose. The router has a scribing cutter at one end. Other forms of bit are the tool-steel cutters used for metal turning; and the jack-bits screwed to the ends of rock drills.

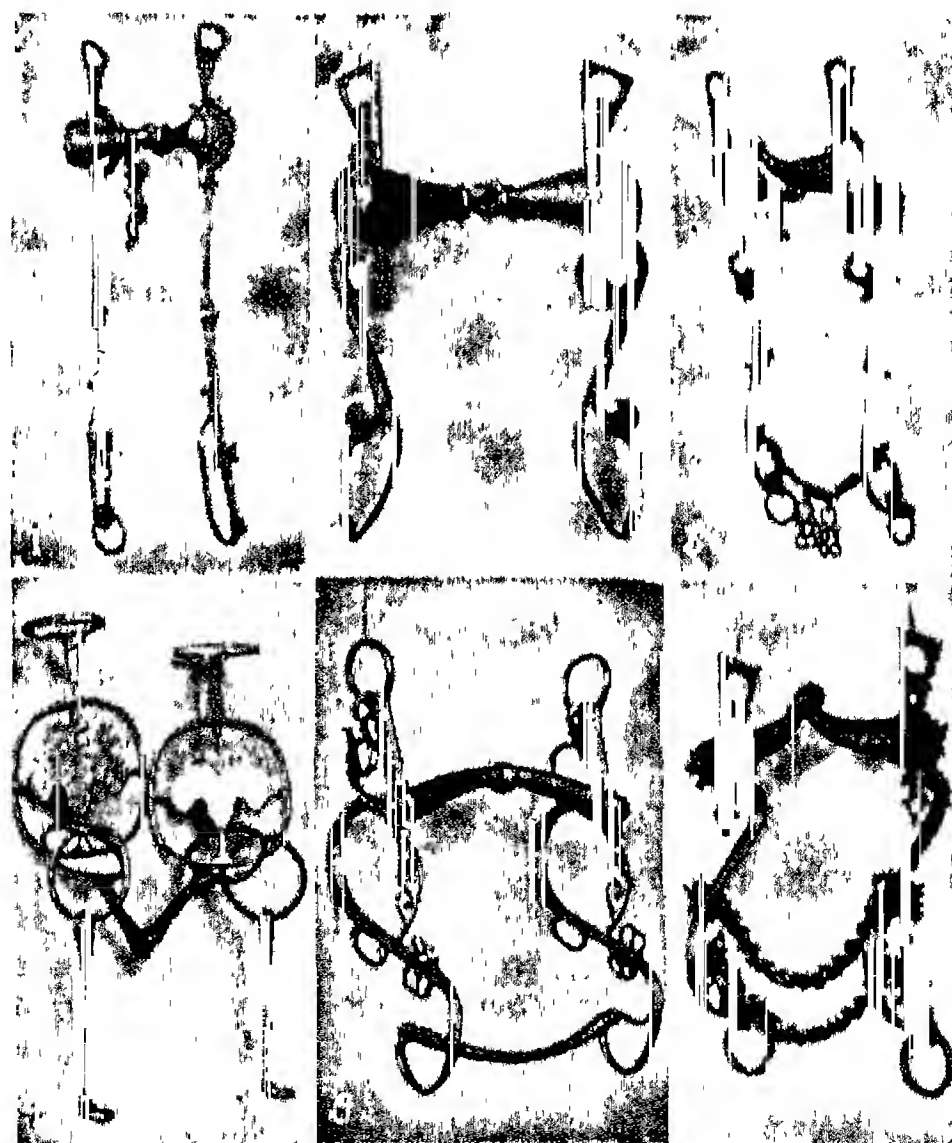
Bitche. This town of Lorraine is noticed under Bitsch.

Bite. Wounds caused by bites of animals should be cleaned with an antiseptic solution and covered with a thick dressing. Particular care is necessary as the teeth of the animal may introduce



Bit. Varieties of the wood boring tool: 1. Twist bit; 2. centre bit; 3. nose bit; 4. shell bit; 5. gimlet bit; 6. expanding bit

Richard Melhuish & Co., Ltd.



Bit (mouthpiece of bridle). 1. German, late 15th cent. 2. German, 16th cent. 3. Milanese, damascened with gold, 16th cent. 4. Japanese, 17th cent. 5 and 6. German, 17th cent.

bacteria; localised crushing of tissue is always present, and local sepsis may develop into septicaemia. If there is reason to believe that a dog has rabies (hydrophobia), the wound from its bite should be opened and cauterised with pure carbolic acid, and the preventive treatment worked out by Pasteur begun immediately.

The adder is the only snake in Britain that has a poisonous bite, but it is rarely fatal. Children and persons in poor health suffer most. The symptoms, swelling in the neighbourhood of the bite, giddiness, rigors, and collapse, generally come on within a few hours. The pupils are dilated and the skin is cold and clammy. In severe cases, delirium and unconsciousness may supervene. Symptoms of collapse should be treated by stimulants—strong coffee, brandy, or strychnine. Poisonous snakes are common in hot countries, and many varieties are known. Their poisons fall into two main classes: one acts mainly on the central nervous system, the other chiefly by coagulating the blood. The treatment of both is similar: it is stimulation, the use of a tourniquet well above the bite on a limb, and the appropriate antivenin—the antibody peculiar to the poison of the attacking snake. Insect bites may be relieved by application of strong spirits of ammonia. The results of a bite are not in ratio to the size of the biting organism. The bite of the anopheline mosquito transmits the most widespread disease in the world, malaria; the bite of the body louse may transmit typhus.

Bithur. Town of India, in the Cawnpore district of the Uttar Union. It stands on the Ganges 12 m. by rly. N.W. of Cawnpore. A pilgrimage place for Brahmins, it has many fine pagodas and ghats. It was prominent in the Mutiny, being taken July–Aug., 1857, by Havelock, who defeated Nana Sahib and destroyed his fortress.

Bithynia. Ancient division of Asia Minor. It was bounded W. by the Sea of Marmara, or the Propontis, N. by the Black Sea, S. by Phrygia, and E. by Paphlagonia. The Bithynians were probably Thracian immigrants. In the 7th cent. B.C. Bithynia belonged to Lydia, but it was conquered by the Persians under Cyrus in 546 B.C. Its princes, however, became independent under Nicomedes I (d. 246 B.C.), their kingdom lasting until Nicomedes III bequeathed it, in 74 B.C., to the Romans, by whom, after about ten

years' separate existence as a province, it was united with Pontus. Herein were the Greek cities of Chalcedon and Heraclea, also Nicomedia, a favourite residence of the emperor Diocletian. It was conquered in 1298 by Osman the Turk, who made Brusa (Bursa) capital of the kingdom of the Osmanli.

Bitlis OR BETLIS. Vilayet and town of Turkey. The town is built in a ravine which is surrounded by hills, and is 60 m. W. of Lake Van. It was the scene of a Persian victory over Solymán the Magnificent in 1554. Bitlis contains many mosques, bazaars, and convents, a palace, and a ruined castle. Cotton fabrics and firearms are manufactured, and tobacco and raw wool exported. In 1895 it had a pop. of 40,000, about half Armenians, but in that year many Armenians were massacred by the Turks. In the First Great War part of the town was ruined, and its pop., owing to further massacres, fell to about 15,000. The vilayet has mineral deposits and springs. Pop. (1950) vilayet, 85,300; town, 11,152.

Bitolj. Yugoslav name of the town better known by its Turkish name Monastir (*q.v.*).

Biton and Cleobis. In Greek legend, the sons of Cydippe, a priestess of Hera at Argos. When oxen were unobtainable to draw their mother's chariot to her temple, they drew it themselves. Hera, being asked by Cydippe to reward the piety of her sons, sent them into a sleep from which they never woke, regarding that as the best gift to mortals. The story is told at length by Herodotus.

Bitonto (anc. Butuntum). Town of Italy, in the prov. of Bari. It stands in a fertile plain, 10 m. by light rly. W. of Bari, and 5 m. from the Adriatic. It retains its medieval walls and palace, has a fine Romanesque cathedral and a seminary, and trades in olive oil and wine. The Austrians were here defeated by the Spaniards, May 25, 1734. Pop. (1951) 34,928.

Bitsch OR BITCHE. Town of France, in Moselle dept. (Lorraine). It is in a wooded pass of the Vosges 15 m. S.E. of Sarreguemines. There was a stronghold here in the 12th century, but the town dates from the 17th century. Its industries include the manufacture of boots and shoes and watches, and there is trade in agricultural produce and timber. A strong fortress was constructed by the French on an eminence (250 ft.) in the centre of the town, and it long proved to be impregnable. The Prussians

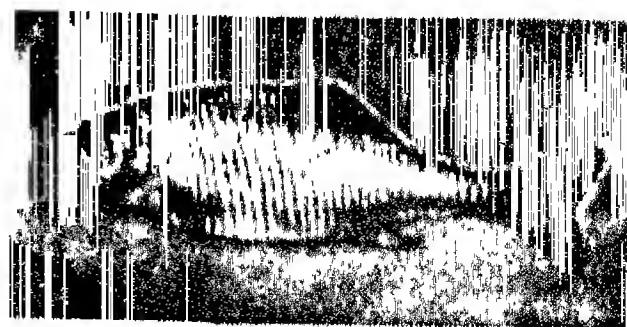
failed to take it in 1793, and in 1815 it withstood a seven weeks' siege by the Germans. During the Franco-German war of 1870–71 it was besieged but successfully resisted. In German-occupied territory from June, 1940, Bitsch was captured by the U.S. 7th army, March 16, 1945. Pop. (1954) 4,401.

Bitter, KARL THEODORE FRANCIS (1867–1915). Austrian-born American sculptor. Born at Rudolfsheim, near Vienna, Dec. 6, 1867, he studied under Kühne and Heller at Vienna, and went to America in 1889 and was naturalised. Successful in an important competition, he became widely known as a sculptor, and in 1893 was chosen to decorate part of the World's Exposition at Chicago. In 1901 he was made director of sculpture for the exhibition at Buffalo, and was similarly engaged at St. Louis. He died April 10, 1915.

Bitterfeld. Town of E. Germany, in the Halle district, on the Mulde, about 25 m. N. of Leipzig. It was founded by Flemings in the 12th century. Virtually a residential district for merchants of Leipzig and other neighbouring towns, its industries, which depend partly on the coalmines in the neighbourhood, include the manufacture of earthenware pipes, machinery, and paper material for roofing. It is also a railway junction. Bitterfeld was part of Saxony from 1476 until it was handed over to Prussia in 1815. In the Second Great War it was captured by the U.S. 1st army, April 22, 1945. Pop. (est.) 22,000.

Bitter Lakes. Two lakes of Egypt, known as the Great and Little Bitter Lakes, situated N. of Suez. The Suez Canal was cut through them. At the time the operations were begun the lakes were nearly dry. They provide nearly 23 m. of the canal's course, and are divided into two basins, the first 15½ m., the second 7 m.

Bitterling (*Rhodeus amarus*). A small fish of the carp group, somewhat like a roach in appearance.



Bitterling. A fresh-water fish of Central Europe, with a bitter flavour

Found in Central Europe, it rarely exceeds 3 ins. in length. The name is given to it by reason of the bitter flavour of its flesh.



Bittern. British marsh bird in its nest among the reeds

Bittern (Fr. *butor*, Lat. *butio*). Marsh bird, closely related to the heron, belonging to the genus *Botaurus*. There are some half a dozen species, of which the common bittern is found in many parts of Europe. It was formerly plentiful in the fen districts of England. A handsome bird, about 28 ins. long, with buff plumage barred with brown and black, the bittern is remarkable for the thick appearance of its long neck, due to the arrangement of the feathers. During the breeding season it makes a peculiar booming sound. It feeds upon frogs and small fish, and has even been known to kill and eat a fair-sized pike. Its nest is made of rushes, on the ground close beside water, well concealed among thick vegetation.

Bittern. Bitter liquor left after the separation of common salt from sea-water by crystallisation. The sea-water is evaporated by artificial heat or by the sun's rays until the salt crystallises out. Bittern contains magnesium chloride and smaller amounts of bromide and iodide. It was formerly the chief source of the chemical element bromine.

Bitter Pit. Disease affecting apples. Small brown spots appear in the flesh of the fruit, especially at the end farthest from the stalk, and after a time, as the brown marks extend deeper into the flesh, the skin sinks into corresponding pits. The brown tissue is found to contain unaltered starch, though that of the surrounding flesh has already been converted into sugar in the ripening process. This starch often acquires a bitter taste.

Bitterroot (*Lewisia rediviva*). Perennial herb of the family Portulacaceae, a native of N.W. America. It has a fleshy, tapering root, supporting rosettes of slender, succulent leaves. The rose-coloured flowers (3 ins. to 4 ins. across) are borne singly on a short stalk, opening only in sunshine, after the leaves have

withered. The root is filled with starch of a bitter taste, but is used as food by the Indians.

Bitter Root. Mt. range of the U.S.A. It forms the greater part of the boundary between Idaho and Montana, U.S.A., and is the watershed of the Bitter Root and Snake rivers. The height is between 9,000 and 10,000 ft.

The Bitter Root river, after leaving the mountains, effects a junction with the Hell Gate river, $2\frac{1}{2}$ m. below Missoula, and the united stream then forms a branch of Clarke's river. In its upper course it is called St. Mary's river and from Missoula to its confluence with Clarke's it is known as Missoula or Bitter Root.

Bitters. Aromatic, alcoholic beverages, made from infusions of bitter herbs, sugar, and alcohol, and taken as tonics, appetisers, or stomachics. Their usual object is to create appetite or excite the sense of hunger by stimulating the nerves which induce the flow of the salivary and gastric juices. Their antiseptic, medicinal properties, however, are often overrated, and their abuse leads to irritation rather than stimulation. They are drunk usually before meals with gin or sherry. Among substances used in their decoction are angostura, cascarilla, cinchona, gentian, orange-peel, quassia, and quinine, while added flavours are given by cloves, peach kernels, caraway seeds, cinnamon, or juniper. Bitters contain a high percentage of alcohol, and when taken medicinally should be diluted.

Bittersweet (*Solanum dulcamara*), also known as woody nightshade. Trailing shrub of the family Solanaceae, a native of Europe, N. Africa, and Asia. It climbs among hedges and bushes without the aid of tendrils or twining, attaining a



Bittersweet. Hedgerow plant with poisonous bright red berries

height of 5 ft.-6 ft. The leaves are dark green, variable, the lower egg-shaped or heart-shaped, the upper spear-shaped or lobed. The five-lobed corolla is purple, and the bright yellow anthers cohere to form a cone, through which the style penetrates. The fruit is an egg-shaped berry, $\frac{1}{2}$ in. long, first green, then yellow, and ultimately bright red, hanging in loose clusters. Children have been poisoned by eating these berries. Young branches are gathered in autumn for medicinal use. Bittersweet is a narcotic, used in skin diseases and chronic rheumatism. See Nightshade.

Bitumen (Lat.). Solid or semi-solid mixture of hydrocarbons, predominantly paraffins. Bitumens are blackish bodies and include oil, pitch, ozokerite, laterite, and gilsonite, which occur in nature. Asphaltic bitumen is made on a large scale as a residue from the distillation of petroleum. The bitumens are soluble in benzene, carbon disulphide, and some other solvents. The natural bitumens are widely distributed and are of commercial importance in Trinidad, the Caucasus, and the southern states of the U.S.A.

Asphalt is a mixture of bitumen and crushed rock used for paving, road-making, damp-proof courses, and roofing. Mastie asphalt is a mixture of bitumen with slate dust, or some other filler, and sharp, dry sand, which can be cast into blocks. (See Asphalt.) Bituminous paints are used for waterproofing.

Coal tar products, sometimes commercially called bitumen, are mainly aromatic hydrocarbons less resistant to weather than are true bitumens.

Bituminous Coal. Coals of middle rank. The water- and ash-free coal substance has a wide range of chemical composition: carbon, 84 p.c. to 91 p.c.; hydrogen, 4.8 p.c. to 6.0 p.c.; oxygen, 4 p.c. to 11 p.c. Bituminous coal includes coking coals, gas-making coals, and house coals. The name bituminous was applied because these coals have bright black bands in them (similar in appearance to true bitumens), soften on heating and yield a black tar on distillation. See Coal.

Bivalves (Latin *bi-*, double; *valva*, door-leaf). In zoology, one of the main divisions into which the phylum mollusca is divided. They are commonly called lamellibranchs from the fact that their gills are in the form of thin plates or lamellae. All the molluscs of this great division are characterised by

the possession of a shell composed of two valves, covering respectively the right and left sides of the animal, as in the oyster and mussel; thus they are contrasted with the univalves, in which the shell consists of one piece—usually more or less spiral—as in the whelk and snail. Another distinction is that the bivalves have no definite head, though a mouth is present.

The body of a bivalve is laterally compressed, the two valves of the shell covering its sides and not its upper and lower surfaces, as is commonly supposed. The internal organs are symmetrically arranged and paired, and the body is completely covered by the mantle which secretes the shell. The animal obtains food in the shape of particles of organic matter which are drawn in with the water through the inhalent aperture or siphon, and so are passed on to the stomach. Hence there are no jaw and radula, or tooth-ribbon, as in gastropods or univalves.

There is usually a foot, more or less like a ploughshare in shape, which in many species is protruded to push the animal along; and there may be a gland which secretes the byssus or threads by which the mollusc attaches itself to any object, as in the common mussel. Some bivalves remain fixed in one place, as the oyster; others travel by means of the foot, as the swan mussel of rivers and ponds; and others swim by ejecting a current of water through the siphon, as the scallop.

The two valves of the shell are united by an elastic hinge, which tends to pull them open. They are closed by means of two powerful muscles attached to the front and back parts of each valve.

Bivalves are of great economic importance. Many of them, like the oyster, mussel, and scallop, are important articles of food. The inner, nacreous lining of the

shells forms the mother-of-pearl of commerce, while the pearl oyster of the tropic seas yields one of the most valued of gems. On the other hand, certain boring bivalves called ship worms are responsible for much damage to harbour walls and piers.

The classification of the bivalves into orders is a matter of difference of opinion, but the system most in favour is based on the structure of the gills. The nomenclature is still in a state of chaos. See Mollusca.

Bivouac (French, through German *beiwachen*, to watch near). Method by which troops on active service cook and sleep in the open. When buildings are available, the men sleep under cover, but in open country they must make shelters from great-coats, groundsheets, and any wood or branches handy. During the Second Great War certain units were issued with small two-man tents weighing 40 lb. carried on the platoon trucks. When in bivouac the men must remain concentrated and be ready instantly to move off or to engage the enemy. An infantry battalion or an artillery battery requires an area of about 2½ acres in which to bivouac.

In the North African campaigns of the Second Great War the desert armies bivouacked by forming laager. The fighting vehicles were drawn up in parallel columns with their "soft skinned" transport parked inside the lines. Tanks in the flanking columns had their guns swung outwards to meet any sudden night attack; the rear of the laager was protected by a line of anti-tank guns.

Biwa. Largest lake in Japan, in the S. part of Honshu. It is 36 m. long by 2-12 m. broad; area 261 sq. m. It is connected by canal with Kyoto, 5 m. S.W., and supplies the city with hydro-electric power. Partly enclosed by mts.

and dotted with islands, it has exquisite scenery and is popular for excursion ships. It abounds in fish, including carp and trout.

Bixa orellana. Evergreen tree of the family Bixaceae, a native of tropical America. It has heart-



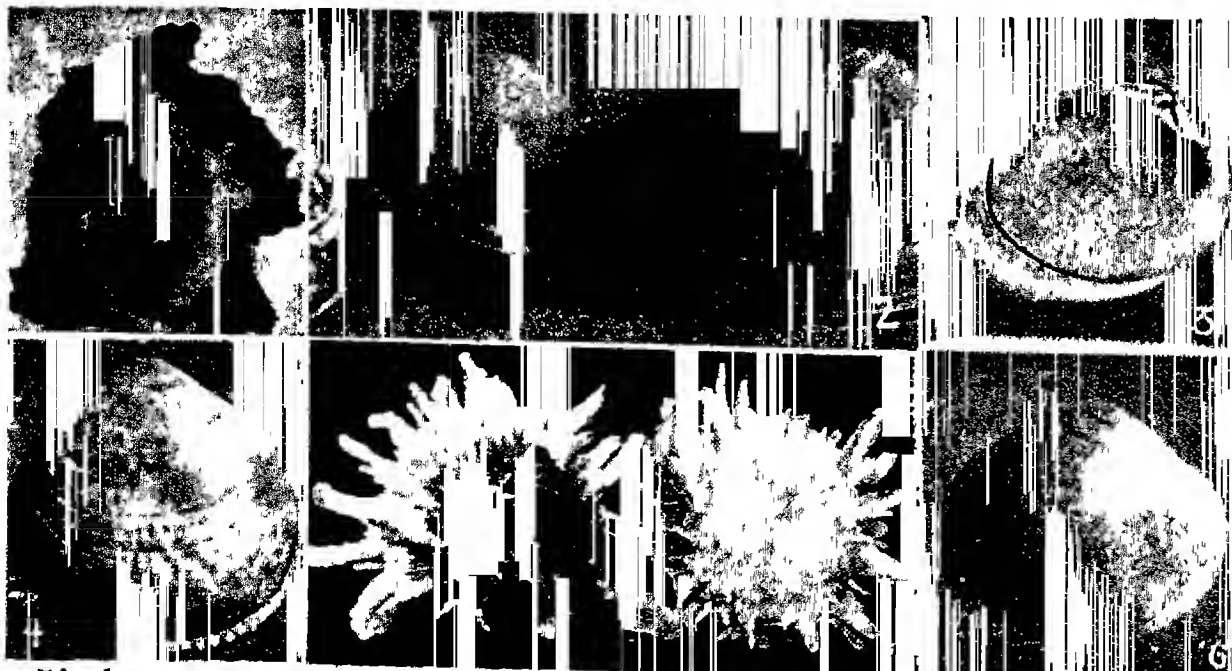
Bixa orellana. Flower and leaves of this evergreen tree of tropical America

shaped, smooth leaves, and large pale-red flowers in terminal clusters. The fruit is a prickly capsule. The seeds are coated with a waxy substance which is washed off and evaporated to the consistency of putty, when it becomes the colouring matter known as annatto (*q.v.*).

Bixio, GEROLAMINO (1821-73). Italian soldier and politician. Born at Genoa Oct. 2, 1821, he played a conspicuous part in the struggle for the liberation of Italy under Garibaldi, especially in the campaigns of 1848 and the expedition to Sicily of 1860, in which he was virtually second in command. He was elected to the chamber of deputies, 1866, and became a senator in 1870. He died in the East Indies, Dec. 16, 1873.

Bixschoote. Village of Belgium, in the prov. of W. Flanders. It is situated 6 m. N. of Ypres and E. of the Yser Canal. Prominent in the Ypres salient fighting throughout the First Great War, it was an important bastion of the British line, whose front in the first battle of Ypres ran from here to Armentières in the S. Bixschoote was captured by French troops fighting on the British left on July 31, 1917, in the third battle of Ypres. In their offensive of April, 1918, against the Ypres sector, the Germans attempted to capture it and to force the Yser Canal, without success. See Ypres, Battles of.

Bizerta (Fr. Bizerte). Naval station and seaport of Tunisia. It occupies a valuable strategic position at the head of a bay, and is the most northerly town of Africa, 38 m. N.N.W. of Tunis, with which it is connected by rly.



Bivalves. 1. Devil's claw clam shell, opened. 2. Venus shell. 3. Smooth Venus shell, interior. 4. Dog cockle. 5. Thorny oyster. 6. Venus shell, exterior

Bizerta is the ancient Hippo Diarrhytus or Zarytus, and was founded by the Phoenicians. Taken by Agathocles in 307 B.C., and by the Arabs in A.D. 622, it was occupied by the French in 1881. Behind the city are two large lakes, the Lake of Bizerta and the Garaat Achkel.

In the First Great War it was a transport base. After the Allied landings in French N. Africa, Nov., 1942, German and Italian forces landed at Bizerta from transport planes on Nov. 14 and were engaged unsuccessfully by French forces. Bizerta was raided repeatedly by the Allied Air Forces until May 7, 1943, when the 47th regimental combat team of the 9th U.S. div. entered it. Pop. (1946) 39,327 (Europeans, 9,893).

Bizet, ALEXANDRE CÉSAR LÉOPOLD (1838-75). French composer, usually known as Georges



Georges Bizet

Bizet. Born near Paris, Oct. 25, 1838, the son of a teacher of singing, he studied at the conservatoire under Halévy, whose daughter he married in 1869. His first opera, *La Prêtresse*, was performed at Baden, 1854, and *Le Docteur Miracle* won the prix de Rome, 1857. These works, rarely heard today, gave little hint of the dramatic power revealed in *Les Pêcheurs de Perles*, 1863, and *The Fair Maid of Perth*, 1867, operas which were unsuccessful until the production of his masterpiece *Carmen*, at the Opéra Comique, Paris, 1875, made his name world famous. Bizet's other works include *L'Arlésienne* and *Jeux d'Enfants*, both popular orchestral suites. A fine pianist, Bizet was praised by Liszt and Berlioz. He died June 3, 1875.

Consult Life, M. Cooper, 1938.

Bjelovar (Hung. Belovár). Town and district of Yugoslavia, in Croatia. Until the end of the First Great War they were in Hungary. The town is 62 m. by rly. E. of Zagreb, and is situated on the southern slope of the low hills which surround the basin of the Cuzma, a tributary of the Save. Many cattle and pigs are reared in the neighbourhood. Three-quarters of the inhabitants of the town are Roman Catholic Croats; the remainder include Greek Orthodox Serbs and a few Magyars.

Björneborg. Swedish name of the seaport of Finland called in Finnish Pori (*q.v.*).

Björnson, BJÖRNSTJERNE (1832-1910). Norwegian poet, dramatist, novelist, and politician. The son of a Lutheran clergyman, he was born at Kvikne, Osterdalen, Norway, Dec. 8, 1832, and educated at a Mold school and at the university



of Christiania (Oslo). In 1855 he wrote his first play, *Between the Battles*, and in 1856 became director of the theatre at Bergen.

He first attracted attention by his stories of peasant life with which he had been familiar as a boy—*Synnöve Solbakken*, 1857; *Arne*, perhaps the most popular and widely translated of all his works, 1858; and *A Happy Boy*, 1860. To this class belonged *The Fisher Maid*, which was published in 1868: but long before that he had become recognized as a dramatist of the first rank. *Lame Hulda*, 1858, proved a success. Björnson spent two years in Italy 1860-62, and during this period composed the drama of *King Sverre*, 1861, and the trilogy of plays entitled *Sigurd the Bastard*, 1862, which are among the finest things in Norwegian literature. These historical dramas made him world-famous. In 1863 the parliament of Norway voted him a pension.

From 1861 Björnson was director of the National Theatre, Christiania, and from 1866 to 1871 editor of the *Norsk Folkeblad*. Besides plays he published a volume of poems and songs in 1870, and a drama *Sigurd the Crusader*, 1872. Among his later plays of note were *The Editor*, 1874; *Beyond our Powers*, published 1883, staged 1890; *Laboremus*, 1901; and *Dagelannet*, 1904. In 1884 he brought out a remarkable novel, *Flags are Flying in Town and Port*, and in 1889 the not less striking *In God's Way*. In 1877 he bought a property at Aulestad, and lived on it, but he travelled much in his later years, and frequently resided in Paris. In 1903 he was awarded the Nobel prize for literature. He took a prominent part in the proceedings which led to the separation of Norway from Sweden in 1905. In later years his powers failed, and

he died in Paris, April 26, 1910. An English trans. of his novels, ed. by E. Gosse, was pub. in 1895.

Björnsson, SVEINN (1881-1952). President of the republic of Iceland. He entered the legal profession and was advocate to the supreme court of Iceland in 1907. Elected a member of the Althing in 1913, he attended The Hague Conference for the codification of international law in 1930. Icelandic minister to Denmark, 1922-24 and 1926-41, he was elected regent of Iceland June 17, 1941, on the declaration of independence from Denmark. On June 17, 1944, Iceland was formally proclaimed a republic, and Björnsson was elected president. He died Jan. 24, 1952.

Bjornstjerna, COUNT MAGNUS FREDERIK (1779-1847). Swedish diplomat. Born Oct. 10, 1779, at Dresden, the son of the secretary to the Swedish legation, and educated in Germany, he joined the Swedish army in 1793. After taking part in the Finnish war, he was in command of the troops sent to support the Allies in 1813, and he arranged the terms of the French capitulation at Lübeck and Maastricht. He signed the treaty of Kiel which transferred Norway from Denmark to Sweden. Ambassador in London, 1828-46, he died at Stockholm Oct. 6, 1847.

Black. Term applied to various pigments and varnishes. Lamp-black is the soot obtained by imperfect combustion of oily, fatty, resinous, or tarry matters. Bone-black is obtained by charring bones, ivory-black by calcining ivory in a closed vessel. These black pigments are forms of carbon. The chief black varnishes are Berlin black and Brunswick black. These consist of asphalt or pitch dissolved in boiled oil and turpentine, and are employed as protective coatings for iron-work.

Black, ADAM (1784-1874). A Scottish publisher and politician. Born in Edinburgh, Feb. 20, 1784, and educated at the high school and university, he served for five years as a bookseller's apprentice. He was for some years with the London firm of Lackington, Allen & Co., and then, returning to Edinburgh in 1808, started business on his own account. In 1827 he acquired the copyright of *The Encyclopædia Britannica*; in 1851



Adam Black, Scottish publisher

—when, with his nephew Charles as partner, he founded the firm of Adam and Charles Black—that of Scott's Waverley novels; and in 1861 that of De Quincey's works.

Black was twice lord provost of Edinburgh, and succeeded Macaulay as Liberal M.P. for the city, 1856–65. He declined a knighthood and died in Edinburgh, Jan. 24, 1874, after which the business was carried on by three of his sons, James, Francis, and Adam. A statue to his memory was placed in East Princes Street Gardens in 1877. The headquarters of the business were removed to Soho Square, London, in 1889.

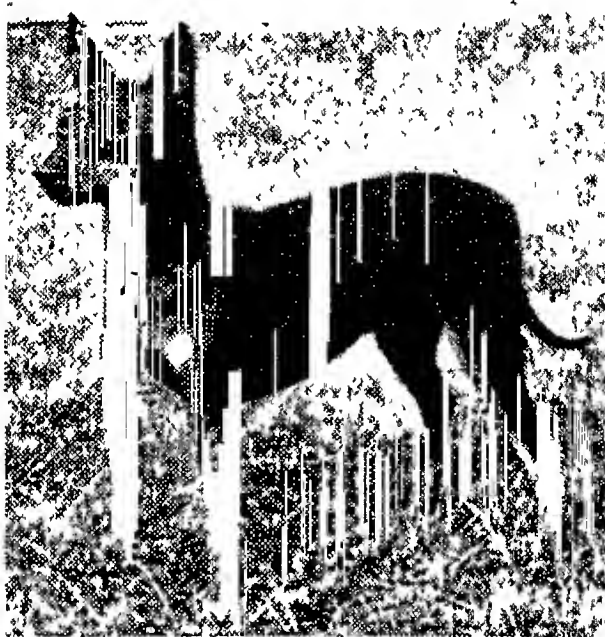
Black, GEORGE (1890–1945). British theatrical manager. Born at Birmingham, he left school at the age of 11 to join his father's small touring circus. Black came to London in 1928 as director of the General Theatre Corporation, and in 1933 the amalgamation of the Moss Empire circuit placed under his direction 40 music-halls. The creator of modern variety entertainment, combining music-hall and revue, he displayed a bold sense of showmanship, and was responsible for the "crazy shows" of the London Palladium and spectacular entertainments at the London Hippodrome. He arranged several royal command variety performances. Black died Mar. 4, 1945.

Black, JAMES MACDOUGALL (1879–1949). Scottish ecclesiastic. Born at Rothesay, Jan. 25, 1879, he went to Glasgow and Marburg universities. Ordained 1903, he became minister at Forres and at Broughton Place, Edinburgh, and was a chaplain in the First Great War. Minister of S. George's West, Edinburgh, 1921, moderator of the general assembly of the church of Scotland 1938 and 1939, in 1942 he became chaplain to the King. He died Oct. 18, 1949.

Black, JOSEPH (1728–99). A British chemist. He was born at Bordeaux, the son of a Belfast wine-merchant, and was educated at Glasgow and Edinburgh universities. He took his medical degree at Edinburgh, 1754, with a thesis, *Experiments upon Magnesia Alba, Quicklime and some other Alkaline Substances*, which was the first detailed study of a chemical reaction. In this he related the discovery of the gas carbon dioxide given off by heating marble (calcium carbonate). He also discovered magnesia, previously regarded as a variety of lime. He discovered that to produce liquefaction, ice requires to absorb a large amount of heat. The theory

of latent heat which resulted was extended to the phenomena of boiling and evaporation. Black was professor of chemistry at Edinburgh from 1766 until his death, Dec. 6, 1799. *Consult* Life and Letters, ed. W. Ramsay, 1918.

Black, THOMAS CAMPBELL (1889–1936). British airman. Born at Brighton, he was educated at Brighton College and the Naval College, Greenwich, serving in the R.N.A.S. and the R.A.F. during the First Great War. He settled in Kenya and made 13 flights between that country and England. In Oct., 1934, he flew with C. W. A. Scott to win the air race from England to Australia in 70 hrs. 54 mins. He was killed at



Black and Tan Terrier. Small, smooth-haired dog, weight up to 8 lb.

Liverpool airport, Sept. 19, 1936, when his aircraft collided on the ground with an R.A.F. bomber.

Black, WILLIAM (1841–98). British novelist. Born at Glasgow, Nov. 9, 1841, and an art student in his youth, in 1866 he was correspondent for The Morning Star in the Austro-Prussian war and during 1869–74 assistant editor of The Daily News. His novels include *Love or Marriage?*, 1868; *In Silk Attire*, 1869; *Kilmeny*, 1870; *A Daughter of Heth*, 1871; *Strange Adventures of a Phaeton*, 1872; *A Princess of Thule*, 1874; *Madcap Violet*, 1876; *Macleod of Dare*, 1878; and *White Heather*, 1885. He died at Brighton, Dec. 10, 1898.

Black-and-Tans. Name given to auxiliary armed police employed in Ireland, 1920–21. In June, 1920, during the rebellion in Ireland, a number of men were enlisted in Great Britain and sent over to counter the terrorist tactics of the rebels. The uniform

was a dark green beret, khaki tunic and trousers or breeches, brown boots, and frequently a black belt of the Sam Browne type. The nickname, suggested by the colour of the clothing, was derived from the name of a well-known pack of hounds. The activities of the auxiliaries possibly helped rather than hindered the revolutionaries, because their violent methods exacerbated hatred of British rule where it had not previously been strongly felt.

Black and Tan Terrier, MINATURE. An old breed which should be a replica in miniature of the Manchester terrier, though it does not always conform to this pattern. Sturdily built, it should have a flat narrow head, with erect or semi-erect ears, a short body, and a deep but narrow chest. The colour is jet black with rich mahogany tan which should be distributed in a very precise pattern. The coat is close, smooth, short, and glossy. This breed should not weigh more than 8 lb. when fully grown.

Black Ape (*Cynopithecus niger*). Species of monkey. A connecting link between the macaques and the baboons, it is found in the island of Celebes. Its hair and skin are a dense black, its face is almost as long as that of a baboon, and its tail is a mere stump. It has a large crest of hair on the crown of its head. *See* Monkey.

Black Arrow, THE. Romance of adventure by R. L. Stevenson, published in 1888 with the full title of *The Black Arrow: a Tale of the Two Roses*.

Black Art. Term applied to magic generally, and also in a narrower sense to necromancy proper, i.e. divination by evoking the spirits of the dead (Gr. *nekros*, dead body; *manteia*, divination). The epithet "black" is largely due to the medieval mistake of using the form *nigromantia* instead of *necromantia*, as if the first part of the word were derived from Lat. *niger*, black. *See* Necromancy.

Black Assize. Name given to an epidemic which raged at Oxford in July and Aug., 1577. It was so called because it first appeared at the close of the assizes on July 6. The deaths between that date and Aug. 12 were estimated at 300.

Black-balling. Excluding of candidates from election to membership of a private club. The term arises from the retention by many clubs of the original system of secret voting by the use of small balls, white for agreement, black for dissent. The number of black balls necessary to exclude a



William Black, British novelist
Elliott & Fry

candidate varies, but is always small. See Ballot.

Black Bass. Fish belonging to the sunfish family (Centrarchidae) and allied to the common perch of British waters. It is widely distributed in the fresh waters of the N. American continent, where two varieties are found, the small-mouthed (*Micropterus dolomieu*) and the large-mouthed (*M. salmoides*), the latter sometimes weighing 20 lb. Both rise to the fly and are excellent for the table. Black bass imported into English waters have done well.

Black-beetle. An alternative popular name for the cockroach (*Blatta orientalis*), though it is neither black nor a beetle. It is an insect of the order Orthoptera, so that its relationship is closer to the crickets and grasshoppers than to the beetles. All orthopterans leave the egg in a form similar to that of the adults, minus wings, while beetles begin life as grubs and pass through an inactive chrysalis stage.

The cockroach is a little over an inch in length, with a pair of long and sensitive feelers on the head, and two short stylets projecting from the hind extremity. The colour is a dark brown. Only the adult male has wings, of which the upper pair are leathery and opaque. With its powerful jaws it attacks almost anything in the house where it makes its home. It is not native to Britain and its country of origin, believed to be Asiatic, is not known. It reached England by the middle of the 17th century, presumably in merchandise from the East.

Blackberry. Popular name for the multiple fruit of the bramble (*q.v.*), and its varieties.

Blackbird (*Turdus merula*). A familiar song bird of Great Britain, occurring also in most parts of Europe and in Asia and N. Africa. The plumage of the male is deep black, with bright yellow beak; the female has brown plumage, with the yellow of the beak less bright. The young are brown, with speckled breasts. The bird feeds mainly on grubs, worms, slugs, and beetles, and it is, therefore, a friend of the gardener, except in the fruit season when it works havoc with unprotected gooseberries and currants. The eggs, four or five in number, are green

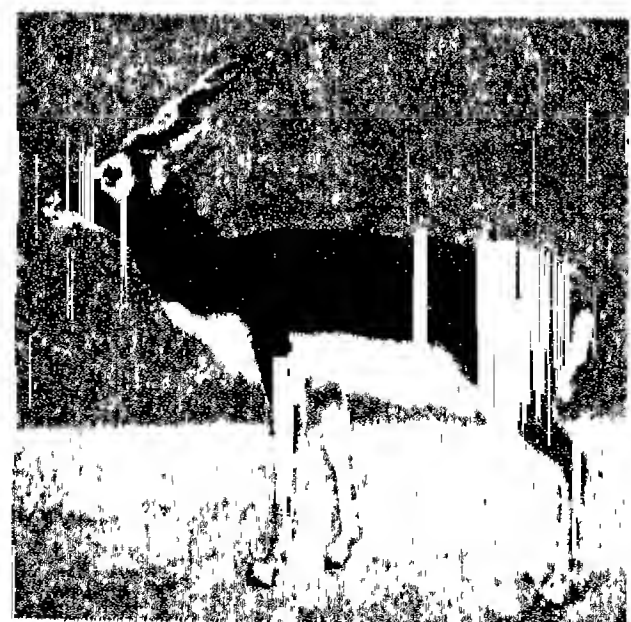


Blackbird. One of the most musical of British birds

mottled with reddish brown. The blackbird generally remains in Great Britain throughout the year, but those in the north migrate to the southern counties in winter. See Bird Song. Consult The Blackbird, A. F. C. Hillstead, 1945.

Black Book. Name given to books containing names of delinquents, such as the proctor's book at a university. It is sometimes applied to books printed from black-letter type or with black covers. The reports on alleged monastic offences presented to the English Parliament in 1536 belong to this category, though they were never published as a book. Other examples are the Black Book of the Exchequer, an account of the royal revenues in the time of Henry II; the Black Book of the (Royal) Household in the time of Henry VIII; Monumenta juridica, or the Black Book of the Admiralty containing the sea laws of Oléron, in the time of Edward II, ed. T. Twiss, 1871-6; the Welsh and Highland bardic MSS. of Carmarthen and Glanranald, ed. W. F. Skene, 1868; and the collections of old English charters of Thomas Hearne, Liber Niger Seaccarii, etc., 1728, ed. Joseph Ayloffe, 1774.

Black Buck (*Antelope cervicapra*). Antelope found in India.



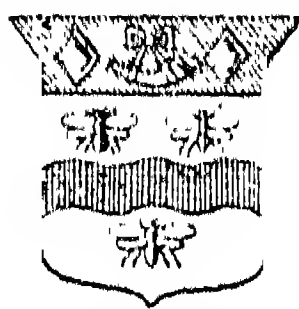
Black Buck or Indian Antelope, remarkable for its ringed, spiral horns

About 32 ins. high at the shoulder, it has handsome spiral horns ringed from base to tip. The males are blackish brown above and white beneath; the females and the young are fawn-coloured above.

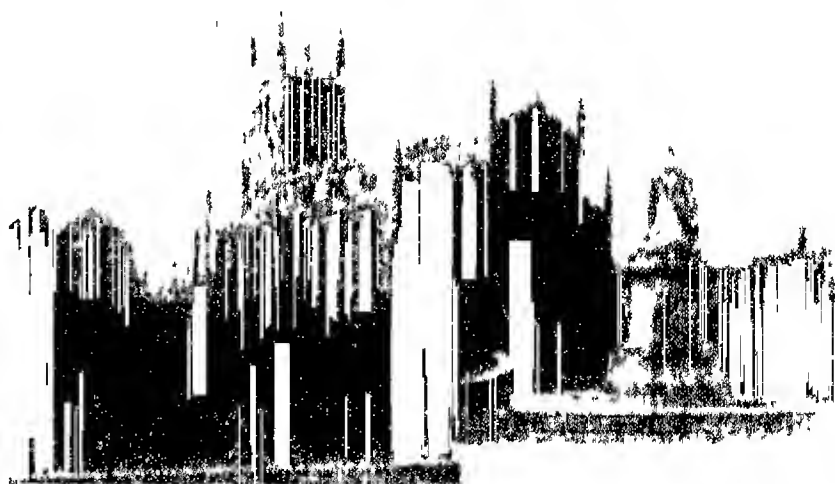
Blackburn. County bor. and diocese of Lancashire, England. It is 211 m. by rly. N.W. from London.

It has a good rly. connections, and is served by the Leeds and Liverpool canal.

Blackburn is celebrated for its cotton manufacture, which superseded during the 18th century the "cheeks" and "greys" for which the town was noted. It expanded rapidly from 1767, after James Hargreaves, born at Standhill near here, invented the spinning-jenny. The workpeople, however, viewed the new device with disfavour and the inventor was obliged to leave the town. Besides cotton factories,



Blackburn arms



Blackburn, Lanes. The cathedral of S. Mary, previously the parish church

there are engineering works, in which a large quantity of machinery for local industries is made. Coal and lime are worked in the vicinity. Public buildings include the town hall, built in 1856 at a cost of £10,000, the exchange, a Gothic building erected in 1865, and the municipal offices.

Blackburn had a church in the 6th century and another was built in the 16th century, but no traces remain. The cathedral church of S. Mary, a Gothic structure, dates from 1826. There is a free grammar school, established by Elizabeth I in 1567, a modern technical school, and several recreation grounds, the most extensive being the Corporation and Queen's parks. The gas, electric light, water supplies, buses, and tramways were developed by the corporation, which has also supplied a museum and art gallery, technical school, public libraries, markets, slaughter-

houses and several hospitals. Blackburn became a bor. 1851, a co. bor. 1888. Part of Blackburn votes in Darwen county constituency, the rest forming a bor. constituency called Blackburn. Market days, Wed. and Sat. Pop. (1951) 111,218. See Blackburn Rovers.

Blackburn, COLIN BLACKBURN, BARON (1813-96). British lawyer. Born May 18, 1813, he was educated at Eton and Trinity College, Cambridge. Called to the bar in 1838, for about twenty years he met with no great success, although his Treatise on the Effect of the Contract of Sale, 1845, secured him a certain practice in commercial cases. In 1859 he was made a judge, and knighted; his learning, moderation, and impartiality won him a very high reputation. In 1876 he was made one of the first lords of appeal under the new system set up in 1873, and a life peer. Retiring in 1886, he died Jan. 8, 1896. An anomaly in the Appellate Jurisdiction Act, which would have excluded him from the lords on his retirement, was amended. Blackburn's judgements, rarely reversed, are often cited.

Blackburne, JOSEPH HENRY (1842-1924). British chess player. Born at Manchester, he became a master of the game at an early age. In 1862 Blackburne gave the first of a large number of notable exhibitions of blindfold play, winning ten games simultaneously without seeing a board. From 1868, when he won the English championship cup, he was prominent at all chess tournaments, and in 1881 he gained the first prize at Berlin, winning 13 games out of 16. He was British champion in 1885-86. He died Sept. 1, 1924.

Blackburn Rovers. Association football club. Founded in 1874 by a few residents of Blackburn, it began to play matches in the locality. In 1878 it acquired a ground, and soon became widely known, chiefly through the efforts of A. N. Hornby and F. Suter. The Rovers were among the first to import Scotsmen into the team. In 1882 they reached the final round for the Association Cup, and in 1884 won it for the first time, repeating their success in 1885, 1886, 1890, 1891, and 1928, securing the Football League championship in 1912 and 1914.

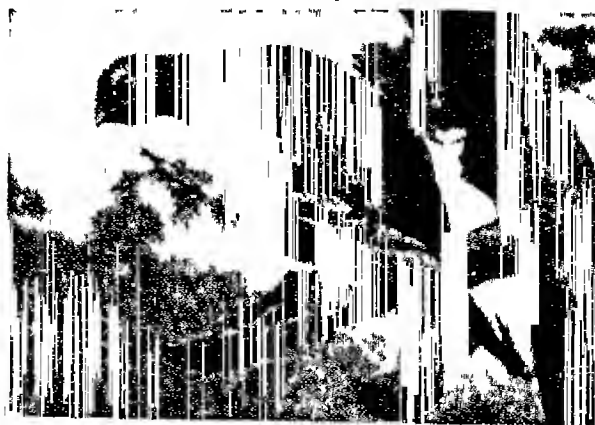
Blackcap (*Sylvia atricapilla*). British song bird belonging to the warbler group. It is brownish grey on the back and lighter on the under parts, and the cock has the patch of black on the head from

which the name is derived. Common in Great Britain in spring and summer, it migrates southwards in the autumn.

Black Cap. Square, cloth cap, which has been part of the full dress of judges of the English High Court of Justice since Tudor times. It is carried in the hand on ceremonial occasions, and is donned in the courts by judges when passing sentence of death.

Black-coated Worker. Term applied to a non-manual worker, one, of either sex, who works in an office in a subordinate capacity, as opposed to a craftsman, machinist, shop assistant, or labourer. This branch of labour is largely unprotected, having no powerful trade union or association, and is the first to suffer in times of stress, because it operates in a highly competitive market. The term came into general use after the First Great War when black-coated workers tended to be left behind by capital and labour in the struggle for existence.

Blackcock. Male of the black grouse (*Lyrurus tetrix*), a game bird of the family Tetraonidae,



Blackcock, or black grouse, common on the moors of England and Scotland

plentiful in the hills of continental Europe and Asia and in the Highlands of Scotland. It occurs also in N. England, but not in Ireland. The cock has glossy black plumage shot with blue, and there are white underfeathers in the tail, which is much used for display. The male is almost twice the size of the female, which is of a duller brown colour, barred with black, and is called the greyhen. The males are polygamous, fighting for possession of the females in the spring. The nest, constructed on the ground, is



Blackcap, song bird of the warbler group

roughly made of grass. The female lays from five to ten eggs, which are yellowish, with a dark brown speckling. The male does not assist in rearing the young.

Black Country. Name applied to the manufacturing district of England situated mainly in S. Staffordshire and partly in Worcestershire and Warwickshire. One of the busiest industrial centres of the United Kingdom, it lies in a region of coal, ironstone, and clay mines, and derives its colloquial title from the grimy aspect of the district and its smoky atmosphere. Extending between Birmingham and Wolverhampton, it includes also Smethwick, West Bromwich, Wednesbury, Dudley, Tipton, Bilston, Walsall, as well as several smaller towns.

Black Damp. Another name for afterdamp (*q.v.*).

Black Death. Name given to a virulent epidemic which spread over a large part of the world in the 14th century. The disease was bubonic plague, which again visited England in the 17th century (*see* Great Plague). One symptom was the occurrence of haemorrhages into the skin, hence the name.

The Black Death appears to have originated in the East, probably in China, and spread to Europe along the great trade routes culminating in a devastating outbreak in 1348-9. The S. European countries were first attacked and the disease spread N. to Norway and Sweden. It has been estimated that at least one-fourth (some say one-third) of the population of Europe perished, while in London alone more than 50,000 persons died; other cities which were severely attacked included Yarmouth, Bristol, Oxford, Norwich, Leicester, and York. Social and religious life was disorganized.

Popular superstition attributed the outbreak to the malevolence of Jews, and thousands of these people were massacred throughout Europe. After the epidemic the great and sudden scarcity of labour had the effect of improving enormously the position of the labourers in their struggle with the wealthy and land-owning classes, and the immediate result was a rise in wages. Efforts were made to prevent this, and instructions were issued to land-owners not to pay more than the customary rates. When Parliament met, the Statute of Labourers was passed, imposing all kinds of penalties upon employers who paid more than the old rates, or upon labourers who refused to work except for a higher wage.

This and later Statutes of Labourers were not repealed until the year 1863; but the effect of the Black Death was to produce a rise

in the rate of agricultural wages, which is estimated by Thorold Rogers to have been 50 p.c. in the case of men and fully 100 p.c. with women. *See* Plague.

Bibliography. Epidemics of the Middle Ages, J. F. C. Hecker, Eng. trans. B. G. Babington, 1844; Six Centuries of Work and Wages, Thorold Rogers, 8th ed. 1906; History of Epidemics in Britain, C. Creighton, 1891-4; The Black Death, G. G. Coulton, 1929.

Blackdown. Name of several hills in southern England. One in Sussex is 2½ m. S. of Haslemere, on the Surrey border, and is placed with Beachy Head as an extremity of the county in Kipling's poem Sussex. Tennyson died in 1892 at his house Aldworth on the E. slope. The hill reaches 918 ft. Blackdown in Dorset is 3 m. N. of Portisham, between Dorchester and Chesil Bank; 777 ft. high, it is crowned by a monument to Hardy, commander of Nelson's flagship at Trafalgar. Blackdown, 1,068 ft., in Somerset, 3 m. N. of Cheddar, is the highest point of the Mendips. There is a Blackdown on the W. edge of Dartmoor, Devon, near Lydford and Marytavy.

Black Draught. A medicinal preparation containing magnesium sulphate (Epsom salts), liquorice, senna, and aromatic compounds. Black draught was first mentioned in 1824.

Black Drink. Famous drink of the Indians of Florida, Virginia, and the Carolinas. It is prepared by infusing the dried leaves of *Ilex vomitoria*, a species of holly, a native of the Southern U.S.A. Although the small, glossy, oval leaves are without spiny teeth, the clusters of white flowers and the small red berries are similar, except in size, to those of the common holly. Cabeza de Vaca (1536) described its ceremonial use by the Cultachiches near the mouth of the Mississippi. The decoction was drunk hot in great quantity and quickly vomited, the dose being several times repeated.

Black Dwarf, THE. Border tale by Sir Walter Scott, issued with Old Mortality in the First Series of Tales of My Landlord, Dec., 1816. It is a romantic setting of the story of David Ritchie (1740-1811), a Tweeddale recluse who was visited by Scott in the summer of 1797. The hero reveals his true identity to prevent an undesirable marriage.

Black Eagle, ORDER OF THE. Former German order of chivalry instituted by the elector of Brandenburg on his coronation as Frederick I of Prussia in 1701.



Black Eagle of Prussia. Collar and badge of the Order. Above, the star

Only persons able to prove noble lineage for four generations on each side were eligible, and only princes and Knights of S. John may wear any other order with it. The badge is a blue Maltese cross having in each angle a crowned black eagle. The ribbon is orange.

Black Earth. Name given to the rich soil of the most fertile parts of the steppe lands of S. Russia, a variety of loess. Black earth was spread over the land by the flooded rivers from the mountain glaciers, and by the sediment-loaded waters issuing from the melting front of the great inland ice sheet of the Ice Age. Enormous quantities of cereals are grown on this land.

Blackett, PATRICK MAYNARD STUART (b. 1897). British scientist. Born Nov. 18, 1897, he was educated at Osborne and Dartmouth, and at Magdalene College, Cambridge. He was professor of physics at Birkbeck College, 1933-37, at Manchester University 1937-53, then at Imperial College, London. He worked with Rutherford on atom-splitting experiments, and served on the British government advisory committee on atomic physics. In 1948 he gained the Nobel prize for physics and published a much discussed book, Military and Political Consequences of Atomic Energy.

Blackfeet. Term now limited to a N. American Indian tribe of the Western Algonquins. Their native name Siksika, or black feet, may refer to their black moccasins. Once agricultural, they became nomad bison-hunters, dwelling in conical tents (*tipi*) formerly of bison hide, more recently of canvas. Now ranging between the Saskatchewan and the Yellowstone rivers, they number perhaps 2,000 in Canada and as many in

the U.S.A. The Siksapa, formerly called Blackfoot Sioux, are now treated as a sub-tribe of the Dakotas. *See* American Indians.

Blackfish. This is described under the heading Caving.

Black Flag. Historically, from classical times, a symbol of death, mourning, or misfortune. Hoisted over a prison, it signifies that a criminal has been executed; hoisted by a ship, it normally means death on board or mourning, though German submarines surrendering in the summer of 1945 were also ordered by the Allies to fly the black flag. Ornamented with the skull and cross-bones it becomes the Jolly Roger, or pirate's flag. The rising of the Chinese population of Formosa against the occupying Japanese in 1895 is called the Black Flag Rebellion.

Black-fly. Name given to the bean aphid (*Aphis fabae*), an insect of the order Hemiptera. Its winter eggs, laid on shoots of the spindle tree, hatch in spring into wingless females. These produce winged progeny which fly to broad beans and there multiply and cause great injury. Protective measures are (1) pinching off the tips of the plants when the aphid first appears; (2) sowing beans, where possible, in November, before the wingless females have hatched. Spraying with derris or nicotine solutions is needed in severe infestations.

Black Forest (Ger. Schwarzwald). Mountain range of W. Germany lying E. of the Rhine. It stretches for about 100 m. from N. to S. parallel to the Rhine, which, turning sharply at Basel, forms its southern boundary. It varies in breadth from 12 m. to 36 m., being narrowest in the N. Its total area is about 1,900 sq. m., with an average height of 2,000 to 3,000 ft.

The Forest contains a number of mountains, Feldberg (4,900 ft.) being the highest, and several lakes and rivers, the most important being the Kinzig. Much of it is covered with trees. It is known as a tourist resort, and in and near are a number of watering-places, including Baden-Baden. Its inhabitants are famous for their skill in making toys, others are engaged in felling and moving the timber, of which a good deal is cut for industrial purposes. The Forest figures as a home of legend and romance.

Black Friars. Term applied to the Dominican Friars, called officially the Order of Preachers. Their dress is conspicuous for

the black cloak and hood worn over a white habit. At the dissolution of the religious houses under Henry VIII, the chief Dominican priory in London stood between Carter Lane and Queen Victoria Street.

Blackfriars. District of London. In the old city it was a precinct situated between S. Paul's and Whitefriars, containing the fortresses of Mount-fichet and Castle Baynard, and the friary after which it was named. This Dominican house, founded by Hubert de Burgh 1276, was despoiled by Henry VIII, 1538. In 1596, on the site roughly represented by The Times office in Printing House Square, James Burbage built the first covered theatre in London, hence the name Playhouse Yard. Shakespeare owned property in Blackfriars. Apothecaries' Hall is in Black



Black Friar. Member of the Order of Preachers
Langher

panic in London business circles. In the U.S.A. two Fridays are known as black: Sept. 24, 1869, when there was a panic in New York caused by an attempt to corner the market in gold; and Sept. 19, 1873, when there were many failures on the New York Stock Exchange.

Black Frost. Term applied in meteorology to a condition when the air temperature is below freezing point but no ice crystals are deposited because there is little moisture. It occurs mostly with a moderate to strong S.E. to N.E. wind and a grey sky.

Blackham, McCARTHY (1855-1932). Australian cricketer, the greatest wicket-keeper of his time. He accompanied the first representative Australian eleven to England in 1878 and captained the eighth of these in 1893, having been in every visiting side. His skill behind the wicket was chiefly responsible for the disappearance of the long-stop. He died Dec. 27, 1932.

Black Hand. A name often taken by criminal organizations, from the symbol employed by them. In Spain towards the end of the 19th century an anarchist Black Hand society, recruited from the working classes, gave much trouble. One of the most dangerous Black Hand societies was an Italian blackmailing organization in the U.S.A., whose outrages led to the formation of White Hand societies to work in conjunction with the police. A notorious Italian gang which had

carried out a series of crimes in Chicago was arrested by the police in Nov., 1919.

Black Hawk (1767-1838). Chief of the Sac Indians. He took the side of the British in the American War of 1812. In 1831-2, owing to a dispute about territory, he went to war with the U.S.A., but after two defeats near the Wisconsin river and at Bad Axe river, was compelled to surrender. He was kept a prisoner until 1833, and died in the reservation near Fort Des Moines, Oct. 3, 1838. Consult *The Black Hawk War*, T. E. Stevens, 1903.

Blackhead OR COMEDO. Small mass of dried secretion which blocks the sweat glands. It becomes oxidised and consequently darker in colour near the surface. Blackheads occur in large numbers in the skin disease known as acne

(*q.v.*). Local treatment consists in loosening the mass by steam, expressing it, and touching the sweat gland with antiseptic. Fundamental cure is achieved by treating the general condition of the patient and remedying faults in food and in hygiene.

Blackheath. Residential suburb of S.E. London, England. It is 5 m. S.E. of S. Paul's, and partly in Greenwich, partly in Lewisham. Its historic common of 267 acres, adjoining Greenwich Park, was traversed by Watling Street. It was used as an encampment by the Danes in 1012; by Wat Tyler in 1381; by Jack Cade in 1450; and by Audley's Cornish rebels in 1497. Here Henry V was welcomed by the Londoners after Agincourt; Henry VIII met Anne of Cleves, and Charles II the army of the Restoration; here also James I is reputed to have introduced golf into England, 1608. Blackheath was a haunt of highwaymen during the 17th and 18th centuries. The suburb has one of the oldest Rugby football clubs, dating from 1860.

There is also a Blackheath in Worcestershire between Smethwick and Halesowen, a few miles west of the centre of Birmingham.

Black Hills. Isolated group of mts. in S.W. of S. Dakota and N.E. Wyoming, U.S.A. They cover 6,000 sq. m., have an average height of 2,050 ft. 3,500 ft., and reach in Harney Peak 7,242 ft. Of domed construction, with a nuclear core of granite under carboniferous rocks, the more recent strata have been largely eroded, appearing as hogs' backs, which surround the mass. Rich in gold, silver, tungsten, tin, coal, petroleum, and other minerals, they are named from the black pines which cover a great part of them. Nearly one-third of their area is set apart as a forest reserve.

Black Hole. Dungeon at Calcutta in which on June 20, 1756, after the surrender of Fort William to Suraj-ud-Dowlah, 146 European prisoners were confined. The



Black Hole of Calcutta. Site of the dungeon enclosed within railings



Blackfriars Bridge, London. Five-arched iron structure over the Thames. It was built in 1865-69

Friars Lane. Blackfriars bridge crosses the Thames from Blackfriars, at the E. extremity of the Victoria Embankment; and here are both a Met. and Dist. rly. station and a sub-terminus of an elec. suburban system. Much of Queen Victoria Street was destroyed, and the church of S. Andrew by the Wardrobe seriously damaged by bombs in 1940. See *Bankside*; *Shakespeare*.

Black Friday. Name given to Friday, May 11, 1866, from the financial panic in England which became most acute on that day. It was caused by the suspension of payments by the famous banking house of Overend, Gurney & Co., which failed for £11,000,000. The name was earlier given to Dec. 6, 1745, when the news that the Young Pretender was at Derby caused a

dungeon was 18 ft. by 14 ft. 10 ins. and during the night the victims, in agony from lack of air, fought to reach the two small windows. In the morning only 23 of the prisoners were alive.

Blackie, JOHN STUART (1809–95). Scottish scholar and author. Born at Glasgow, July 28, 1809, he was the son of a bank manager. He was educated at Marischal College, Aberdeen, and at the university of Edinburgh; he continued his studies at Göttingen, Berlin, and



John Stuart Blackie,
Scottish scholar
Elliott & Fry

Rome. He was intended for the ministry and studied theology; but this he abandoned for the law, becoming an advocate in 1834. This was equally distasteful, so he found his true vocation in literature. In 1834 he published a translation of Faust in verse, and he contributed to Blackwood's Magazine. During 1841–52 he held the chair of humanity (Latin) at Marischal College (Aberdeen), and during 1852–82 that of Greek in Edinburgh university, where he helped to establish the Celtic professorship. He died at Edinburgh, March 2, 1895. He was an ardent supporter of Scottish nationalism and inculcated the national spirit by lectures and letters to the newspapers. Among his works were translations of Aeschylus and the Iliad, a Life of Burns, 1888, and several volumes of poems and essays. *Consult* Life, A. M. Stoddart, 2nd ed. 1895.

Blackie & Son. General and educational publishers, with offices in London and Glasgow. The house was founded in Glasgow in 1809 by John Blackie, who took over the business of W. D. & A. Brownlie, and was later joined by his three sons. In 1816 they began to bind their own books, and in 1829 to print them. Stereotyping, electrotyping, and lithographic departments were added. The firm specialises in dictionaries, educational, technical, and scientific books, and books for the young.

Blacking. Substance for protecting and imparting a polish to leather boots and shoes; used on the coarser types of leather from which the uppers of heavy footwear are often made, so that this leather is still sometimes termed "blacking leather." Blacking is made from such ingredients as

bone-black or lamp-black, oil, treacle, vinegar, and sulphuric acid, and is formed into paste or liquid. When chrome-tanned leathers began to take the place of vegetable-tanned and oil-dressed leathers, as footwear became lighter in weight and more ornamental in design, the use of blacking, properly so-called, became unnecessary. Shoe polishes, creams, and dressings were introduced, composed mainly of wax and turpentine, with colouring matter to suit the shade of the leather. The dressing, while protecting the surface against damp and allowing a good gloss to be built up by the brush or rubber, should not be of such a nature that the leather is rendered stiff and brittle. *See* Boots and Shoes; Leather; Tanning.

Black Isle. District of Ross-shire, Scotland, bounded by Cromarty, Beauly, and Moray Firths. It comprises eight parishes and is served by a branch railway line, which connects the Muir of Ord with Fortrose.

Black Lead. Popular name for plumbago and graphite. A fine quality is found in Cumberland. *See* Graphite.

Black Letter. Name of a type used in the earliest printed books. Also called Gothic, it was modelled on the handwriting in vogue in the Netherlands and Germany in the middle of the 15th century. It was first used about 1445; in England first by Caxton about 1480. Although generally superseded by Roman type in the 16th century, it was long used for Bibles and prayer books, law books, proclamations, acts of parliament and broadsides, and still occurs occasionally in headlines and ornamental printing. Its use persists in a modified form in Germany. Two of the founts designed by William Morris for the Kelmscott Press are Black Letter. In the modern printing trade Black

and gives its name to a Manchester borough constituency.

Black List. Popular name for a list of persons frequently convicted of drunkenness, and whom licensed victuallers are forbidden to serve with drink. In practice the list is obsolete, owing to the difficulty of enforcing the ban.

In both Great Wars the British government issued statutory black lists under the Trading with the Enemy Acts of 1915 and 1939, containing the names of enemy firms in neutral countries with whom British merchants were prohibited from trading. The U.S.A. had a similar list. In May, 1919, the government issued a contractors' black list containing names of individuals and firms ineligible to receive orders for the public service, in consequence of offences in connexion with the supply of war material. During the Second Great War the Black List contained at one time over 10,000 names, mostly from South America.

Blacklock, THOMAS (1721–91). Scottish poet. Born at Aunan,



Thomas Blacklock,
Scottish poet

Nov. 10, 1721, he studied at Edinburgh, and though blind almost from birth acquired Latin and Greek. He was minister at Kirkcudbright, 1762–4, and a doctor of divinity. His letter pointing out the merit of Robert Burns's first collection of poems, 1786, dissuaded Burns from going to the West Indies. Blacklock died at Edinburgh, July 7, 1791.

Blackmail. Popular name for the crime of demanding money with menaces. The menaces may be of personal violence, or of exposure of a crime, or of exposure of

¶ Here begynneth the booke of the subtyl histories
and fables of Esope whiche were translated out
of frenshe in to Englyshe by wylliam Caxton
at westmynstre In the yere of oure Lorde. M.
.CCCC.lxxxij.

Black letter. The opening lines of Caxton's Aesop, showing the date 1483

Letter is called Old English or Elizabethan.

Blackley. N. suburb of Manchester, England. It comprises the ecclesiastical districts of Holy Trinity, S. Andrew, and S. Peter,

a questionable transaction. It is a crime to say or write, "Unless you pay me so much, or give me some other advantage, or do something, or refrain from doing something, I shall shoot you"; or "I shall tell

your wife you have been unfaithful"; or "I shall write of you in the financial press that your business is unsound." Judges look upon this crime with peculiar detestation and always award severe sentences. The word is derived from black and mail (Fr. *maille*, a piece of copper money), and originally signified rent paid in baser coin as opposed to that paid in white money or silver.

Black Maria. The slang name given to the covered van used in conveying prisoners to or from a prison or the court of trial.

The name is said to have been first used in Philadelphia about 1838, one explanation being that a powerful negro woman, named Maria Lee, who kept a lodging-house for seamen at Boston, was frequently called upon to help in getting refractory prisoners under lock and key, her name becoming attached to the special covered conveyance used.

Black Market. Term used, during and after the Second Great War, for the illegal sale, usually at very high prices, of goods that, being scarce, were rationed or otherwise controlled. Because the U.K. was not occupied by the enemy, and she was always able to honour the stated rations of staple needs (which, though not lavish, were sufficient), she suffered in only a minor way from black marketeering in *e.g.* luxury foods, controlled as to price, and in cloth.

In occupied countries the black market organized during occupation as a form of patriotic obstruction to enemy exactions continued after liberation, partly from force of habit, partly because rations could not be met.

Blackmore, RICHARD DODD-RIDGE (1825-1900). British novelist. Born June 7, 1825, at Longworth, Berkshire, he was educated at Blundell's School, Tiverton, and at Exeter College, Oxford. He was called to the bar in



A. J. MacLellan

1852, but soon ceased to practise, and after a few years' school teaching, took advantage of a legacy to settle down at Teddington, Middlesex, where he devoted himself to writing.

Some volumes of verse and translations of Theocritus and Virgil attracted little attention, and his first two novels, *Clara Vaughan*, 1864, and *Cradock Nowell*, 1866, were unsuccessful. But *Lorna Doone*, 1869, his great romance of Exmoor, brought him fame, and before his death passed into more than forty editions. His later novels included *The Maid of Sker*, 1872, *Cripps the Carrier*, 1876, *Christowell*, 1882. He died at Teddington, Jan. 20, 1900. *Consult Life*, W. H. Dunn, 1956.

Blackmore, VALE OF. Region of Dorset, England, in the N. of the county on the Somerset border. It follows a curve S. and E. of Templecombe; Stalbridge and Sturminster Newton are its typical towns; and it is famous for mild air and rich pastures. The Vale of Blackmore figures in the Hardy novels.

Black Mountains. Range of hills partly in Herefordshire, England, but mainly in Brecknockshire, Wales. They form a branch of the range which traverses Carmarthen-shire and Brecknockshire. The highest peak is Waun Fâch, 2,660 ft., in Brecknockshire.

Black Mountains. Mt. group of N. Carolina, U.S.A. A division of the Appalachian system, it contains the highest peaks E. of the Rockies. Geologically complex and well wooded, it is remarkable for its beautiful scenery, and is a favourite tourist resort. The highest points in the group are Mount Mitchell, 6,711 ft.; Hairy Bear, 6,681 ft.; and Balsam Cone, 6,645 ft.

Black-out. Term for preventing visibility from the air of all artificial light, imposed by belligerents during the two Great Wars. The blacking-out of artificial lighting along the coast and in certain larger cities had been enforced in Great Britain during the latter period of the First Great War. In 1938 the R.A.F. conducted extensive experiments to determine the visibility of ground lights from the air, and it was established that a naked candle could be detected by an aircraft flying at a height of 10,000 ft. On Feb. 14, 1939, the Home office issued a memorandum based upon the R.A.F. experiments and detailing the black-out regulations to be enforced in the event of war.

On Sept. 1, 1939, a complete black-out was ordered throughout Great Britain and N. Ireland. Windows and skylights in all premises used after dark had to be screened with light-proof curtains.

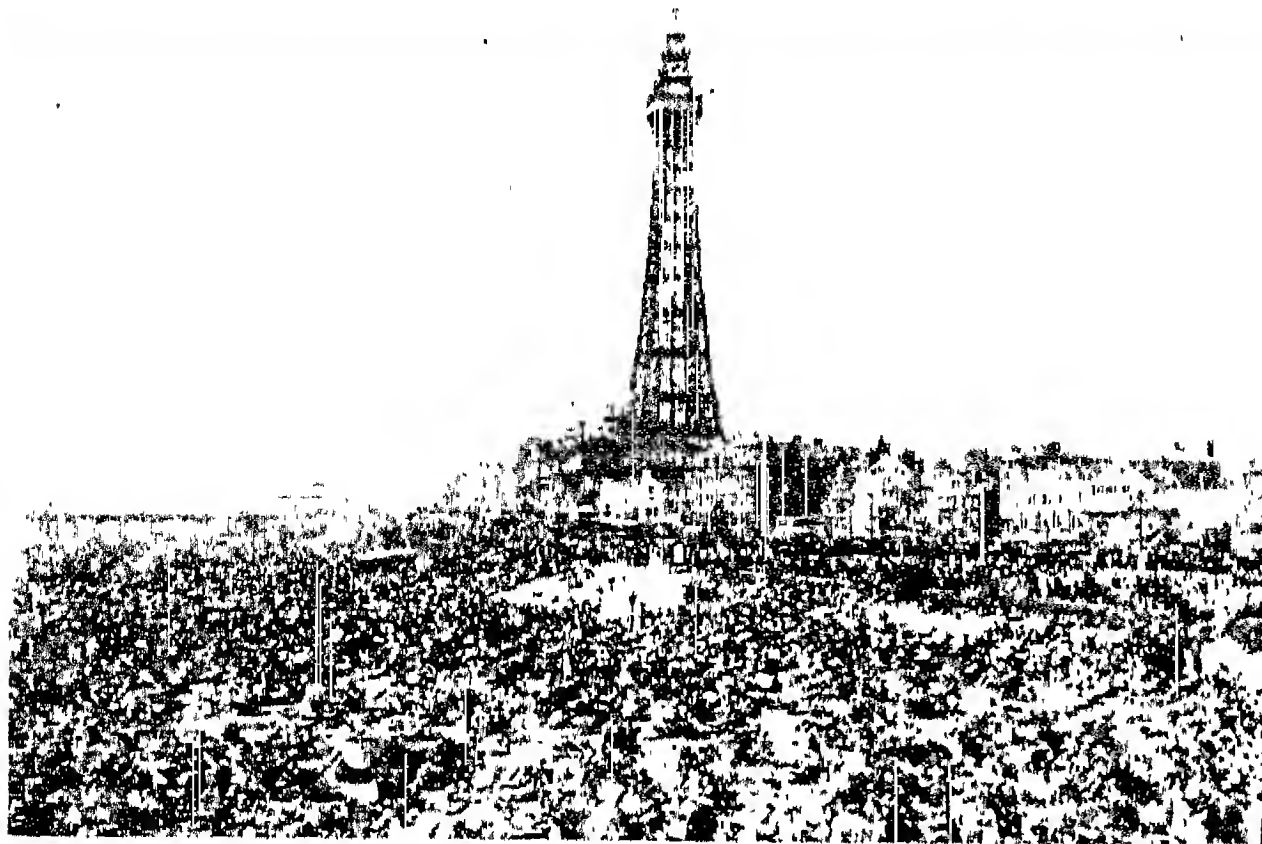
Normal street lighting was replaced by reflectors and dim indicator lights to mark roadways, and all car headlamps were heavily screened. On Dec. 2, 1940, the ministry of Home Security permitted certain modifications of the black-out: shops were allowed to illuminate their windows with direct light which cast no reflection on the street. The following year "starlight" lighting was adopted by most large cities in an effort to relieve the gloom of the streets. Otherwise the black-out regulations were strictly enforced, and were not further modified until Sept. 17, 1944, when half-lighting was permitted for shops and house windows, and a dim-out for streets.

Just before the surrender of Germany the ministry of Home Security, on April 23, 1945, removed all lighting restrictions except in a belt approximately 5 m. wide all round the coast of Great Britain and N. Ireland. On May 11 the black-out was lifted in all parts of Great Britain.

Much controversy took place as to the effectiveness of the black-out as a protection against bombing attacks. It was declared on the one hand that the black-out failed to hide the coastline; accentuated rivers and other natural landmarks; hampered the work of the A.R.P.; slowed down road and rly. traffic and hindered loading; accentuated the position of rly. lines and tramlines as seen from the air; and increased road deaths by 40 p.c. The defence authorities justified a strict black-out on the ground that it prevented enemy aircraft finding and bombing specific targets, and caused bombs to be wasted over a wide area on the chance of hitting a military objective. The black-out was not specifically intended to protect civilian life and property, its principal object being to conceal from the enemy the location of munition factories and military establishments.

Black Plates. In metallurgy, a term originally applied to the highly refined iron sheets made by the charcoal process for tinning. It is still used commercially for the steel sheets in the making of tinplate, before they are subjected to the tinning process. *See Tinplate.*

Blackpool. A county borough and popular seaside and pleasure resort of Lancashire, England. Between Morecambe Bay and the mouth of the Ribble, it is 223 m. N.W. from London by the railway. The Brighton of the

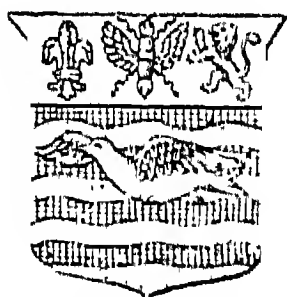


Blackpool. Typical view of the most popular seaside resort of the Lancashire cotton workers. The tower, 500 ft. high, is a famous landmark

North and perhaps the most popular holiday resort in England, with 7,000,000 visitors a year, it has no other industry. It has extensive sands, splendid bathing accommodation, 7 m. of excellent promenades, three piers, winter gardens, a high tower (500 ft.), a pleasure beach resembling New York's Coney Island, 5 pavilions, many theatres and concert halls, and facilities for all the usual sports.

During the season Blackpool is a magnet for the industrial workers of Lancashire, especially for their annual "Wakes." The gas and electric lighting services, markets, and a multi-coloured and well-equipped tram system were developed by the borough. The town is also connected by bus with Lytham St. Annes, on the N. shore of the Ribble estuary. Blackpool was incorporated in 1876 and became a county borough in 1904. It forms two borough constituencies. Pop. (1951) 147,184. During the Second Great War Blackpool accommodated nearly a million extra inhabitants—R.A.F. personnel, Polish units, civil servants, and persons removed from bombed areas.

Black Powder. A common variety of gunpowder, so called to distinguish it from brown powder. The colour is due to the presence of well-burned charcoal, while prism and pebble powders were frequently coated with graphite to give the grains a polished surface. See Gunpowder.



Blackpool borough arms

Black Prince. Popular name of Edward, eldest son of Edward III of England. It was given him on account of his black armour. See Edward, the Black Prince.

Blackrock. Summer resort of co. Dublin, Irish Republic, part of the bor. of Dun Laoghaire. It lies 5 m. S.E. of Dublin city, and has a college and a convent.

Black Rod, (GENTLEMAN USHER OF THE. Officer of the House of Lords appointed by the Crown. The office dates from Henry VIII's reign. Black Rod is usher of the order of the Garter. He or his deputy the Yeoman Usher is present whenever the House is sitting and supervises admission of strangers. He summons the Commons to the House of Lords when a royal speech is read or the royal assent given to bills, and on the occasion of the opening and prorogation of Parliament. While Black Rod is on his way the doors

of the House of Commons are deliberately shut, and he has to knock ceremonially three times with an ebony wand of office before they are opened.

The custom was originally introduced as a protest against the interruption of free debate by Charles I's attempted arrest of the five members in 1642. The office is conferred on a distinguished officer of the

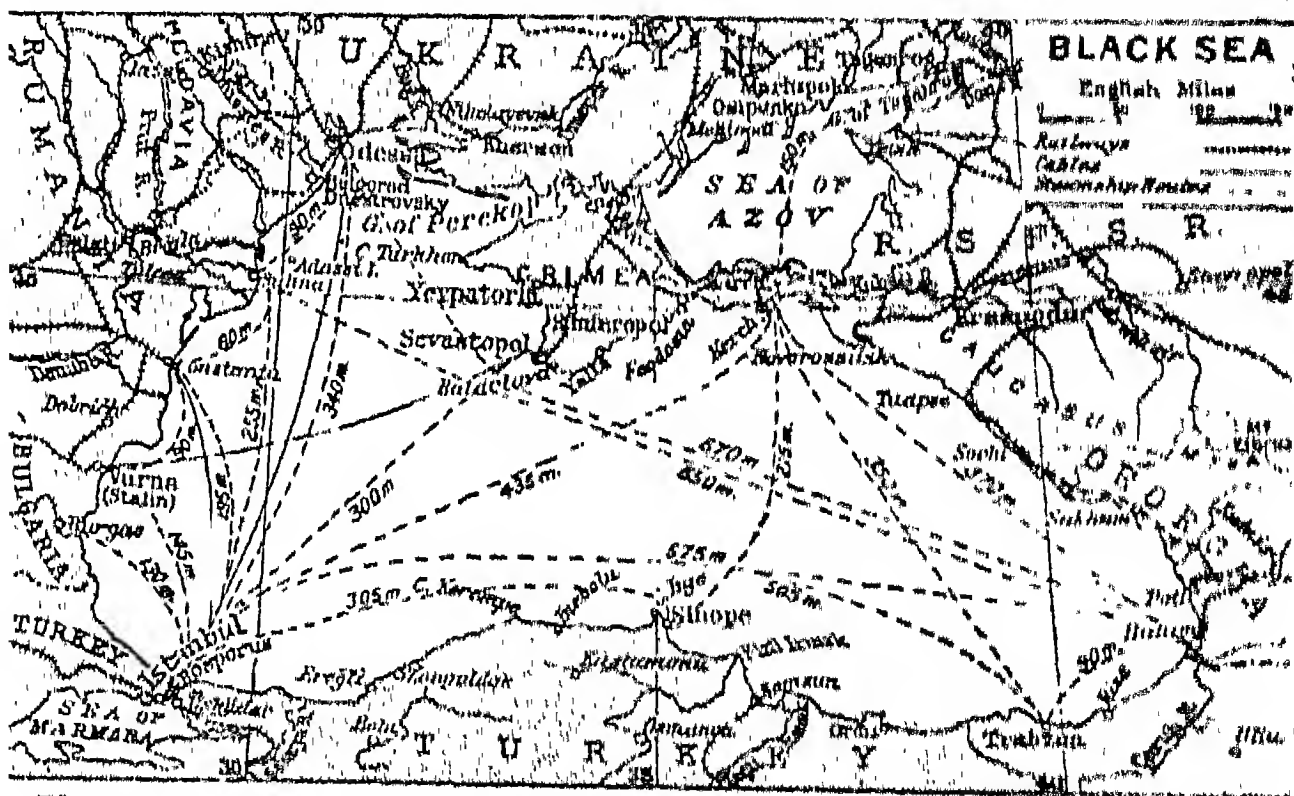


Black Rod. Officer of the House of Lords

Services. When a new peer is introduced to the House of Lords he is escorted by Black Rod, the earl marshal, the lord chamberlain, and Garter king of arms.

Black Scab (*Synchytrium endobioticum*) OR WART DISEASE (*g.v.*). Microscopic fungoid pest of the potato, leading to the formation of black outgrowths on the tubers. It is highly infectious, and may be harboured in the ground in a dormant state for as long as twelve years. The disease is notifiable.

Black Sea, THE. Inland sea of Europe. The ancient Pontus Euxinus, and still known as the Euxine, it is surrounded by the U.S.S.R. on the N. and on the E., Asiatic Turkey on the S., and Bulgaria and Rumania on the W. On the N.E. it communicates with the Sea of Azov by the Kerch strait, and on the S.W. with the Aegean and the Mediterranean by the Sea of Marmara and the Dardanelles. Its coasts are generally high-lying, particularly



Black Sea. Tideless inland sea of Europe, which receives the waters of the Danube and those of the great southward flowing rivers of Russia

in the Caucasus-Armenia regions and on the W., where the Istranja Mts. form rocky headlands close to the shore. It is 720 m. long from E. to W. and about 350 m. wide from N. to S., its area being 150,000 sq. m. Its depth in the centre is about 7,360 ft.

The sea has no tide, but strong currents are caused by the large rivers draining into it, the most important of these being the Kuban and Don, through the Sea of Azov, the Dnieper, Bug, Dniester, and Danube on the N.W., and the Kizil Irmak and Sakarya on the S. Owing to the immense amount of fresh water it receives, the surface water is brackish. The only island is Adassi, at the mouth of the Danube. The sea is easily navigable in summer, but in winter severe storms make navigation dangerous, and ice forms on the N. coasts.

In the N. the Crimean peninsula has a climate like that of the Mediterranean, but the rest is very cold in winter. Among its ports are Sulina, Odessa, Kherson, Yevpatoria (Eupatoria), Sevastopol, Poti, Batum, Trabzon, Sam-sun, Sinope, Varna, and Constanta. By the treaty of Paris, 1856, the Black Sea was neutralised, and Russia and Turkey agreed to abstain from establishing arsenals on its coast; but these arrangements were cancelled in 1871, and both Russia and Turkey placed fleets upon it.

Black Sea, OPERATIONS IN THE. Action here in the First Great War began on Oct. 29, 1914, without any declaration of war from Turkey, with an attack on Odessa delivered by German and Turkish vessels, in which three Russian ships were sunk. Sevastopol was shelled at long range on Oct. 31. On Nov. 18 a squadron of Russian pre-Dreadnoughts encountered the German battle-cruiser Goeben and the Breslau in the Black Sea and inflicted considerable damage on the Goeben. On April 3, 1915, the Turkish light cruiser Medjidieh was mined and sunk off Odessa. She was afterwards salvaged by the Russians, and during the revolution was retaken by the Germans. On Oct. 21, Bulgaria having declared war, the Russian fleet appeared off Varna and shelled the port. Late in 1917 the revolution paralysed the Russian fleet; and in 1918 most of its effective ships were captured by the Germans and Turks when the German army occupied the Russian naval bases on the Black Sea. After the surrender of Turkey, Oct. 30, 1918, Allied warships en-

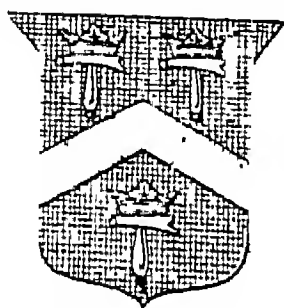
tered the Black Sea, recovered the Russian vessels, and occupied Constantinople (Istanbul).

The Black Sea became a strategic centre for the Soviet fleet in the Second Great War. Before 1941 Germany used this route to import oil from the U.S.S.R., Varna, on the Bulgarian coast, being the port of entry. Constanza, the Rumanian oil port, was heavily bombed by the Russians after war broke out in 1941; Batum, an oil and petroleum base on the S.E. shore, was an important centre for Soviet supplies, since the port lies at the end of the pipe-line from Baku. Novorossiisk, a port on the E. shore to which runs a branch of the oil pipe-line from Grozny to Rostov, was captured by the Germans on September 11, 1942, and remained in their hands for twelve months. By September, the Russians were advancing steadily W., and the position of Axis shipping in the Black Sea became increasingly precarious. Axis forces attempting to escape from the Caucasus and the Crimea by sea suffered heavily from attacks by the Red navy. Early in 1944 the Germans had been cleared from the whole of this area. *See* Crimea; Russo-German Campaign.

Black Shirts. Name given to members of fascist organizations. Members of the Italian nationalist movement, founded by Mussolini (*q.v.*) in 1919, wore black shirts as a uniform and came to be generally referred to in English as Black Shirts.

Sir Oswald Mosley (*q.v.*), the leader of the former British Union of Fascists, founded in 1931, adopted the black shirt for his adherents. The Public Order Act, 1936, made it illegal in the U.K. for anyone to wear in public, without police permission, a uniform associating him with any political organization or object.

Blacksmiths' Company. London city livery company. Incorporated by prescription in 1325, it has written records dating from 1496. It was united with the Spurriers and its first charter granted in 1571. The lease of its hall in Queenhithe expired in 1785 and was not renewed. The company's funds are used to provide pensions and for educational objects. The address of the clerk is 70, Old Broad Street, London, E.C.2.



Blacksmiths' Company arms

Blackstone, Sir William (1723-80). British jurist. He was born in Cheapside, July 10, 1723,



Blackstone

son of a silk mercer, was educated at Charterhouse and Pembroke College, Oxford, and was called to the bar at the Inner Temple in 1746. He was then a fellow of All Souls, and in 1758, having failed to secure a practice in London, he was appointed first Vinerian professor at Oxford. His great work, *Commentaries on the Laws of England*, 1765-69, a reproduction of his professorial lectures, contains the first comprehensive survey of the English legal system. For a time he was also principal of New Inn Hall. Blackstone sat for some years in the house of commons, and in 1770 was made a judge of common pleas. He died Feb. 14, 1780.

Blackthorn or Sloe (*Prunus spinosa*). A shrub of the family Rosaceae, with many stiff branches and twigs which usually end in hard spines. The small white flowers are produced in great abundance before the egg-shaped leaves, and are succeeded by small black drupes, containing a one-seeded stone. There are three fairly distinct forms or sub-species: the sloe, restricted to Europe; the bullace, a native of Europe and N. Africa, and extending E. to the Himalaya; and the wild plum, believed to be native only in W. Asia.



Blackthorn, or Sloe, *Prunus spinosa*

Blacktongue. Condition in which the dorsal surface of the tongue has a black coating. Such a stain may be caused by certain drugs, or mark an old inflammatory site, or reflect the general pigmentation of a condition such as Addison's disease (*q.v.*), but the term is now specifically used for two ailments. In the first the papillae on the back of the tongue become prolonged, simulating hairs. The nature and origin of the pigment are unknown and disappearance is spontaneous. There is no real treatment, but it is advisable to abstain from alcohol, tobacco, and highly seasoned foods.

The second and more important form of blacktongue is caused by deficiency of Vitamin B2 (riboflavin), complicated by other obscure food factors. It is found in cases of pellagra (*q.v.*), and is known and has been studied in dogs.

Black Varnish Tree (*Melanorrhoea usitata*). Large Indian evergreen tree of the family Anacardiaceae. Growing to a height of 100 ft., it has large, undivided, leathery leaves and panicles of red flowers. The very heavy dark-coloured wood is known as lignum vitae of Pegu. Holes are bored in the trunk, and after several days these are found to be filled with a thick, white juice, which turns black after exposure to the air. It is kept fluid by being stored under water, and is used for lacquering.

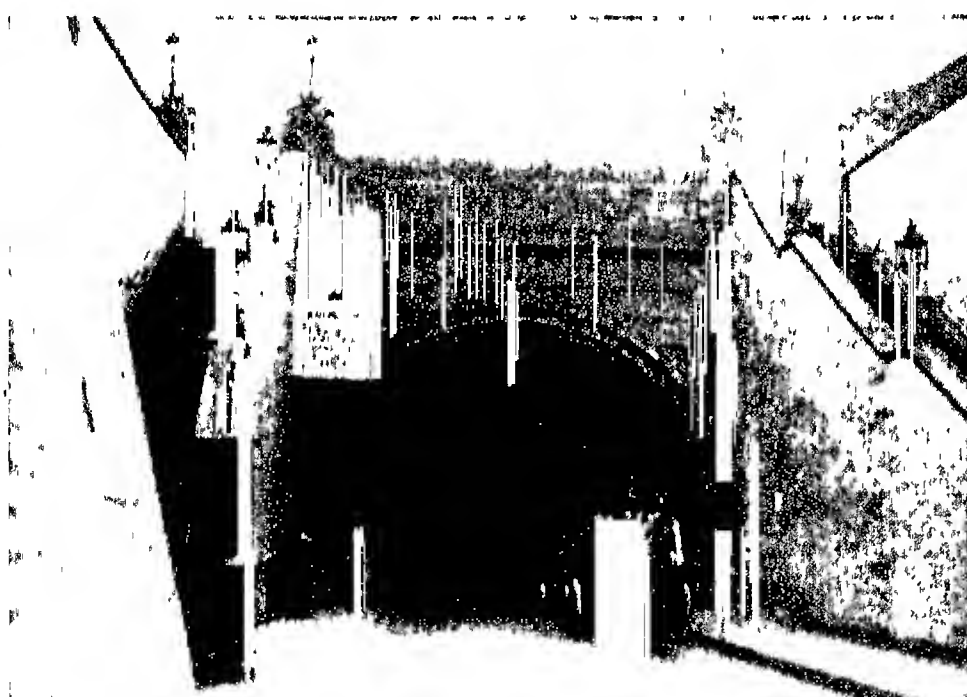
Blackwall. Industrial district of E. London, England, on the N. side of the Thames. The district is in the borough of Poplar. It contains the E. India Docks and vast shipbuilding yards. Blackwall Tunnel, for pedestrians and vehicles, connects it with E. Greenwich. Opened in 1897, the tunnel is 6,200 ft. long, 1,220 ft. being under the Thames. It is a concrete-lined, double iron tube, 27 ft. in external diameter, and its cost was £871,000, or, with the approaches, £1,265,000. In 1938 plans were put forward for duplication of the tunnel.

Black Watch (ROYAL HIGHLANDERS). British army regiment. It originated in independent companies raised in 1739 to preserve order in N. Scotland. These men formed a watch, and from the dark colour of their tartan came to be known as the Black Watch. In 1740 the regiment was added to the British army, and was numbered the 43rd, later the 42nd. A second battalion was constituted a separate regiment, the 73rd, or Perthshires, in 1786, and the two were united in 1881.

The record of the Black Watch began with the charge at Fontenoy in 1745. Their gallantry here was the theme of admiration throughout all Britain. At Ticonderoga in 1759 the Highlanders increased

their great reputation, and they gained the distinctive red hackle badge for conspicuous bravery at Geldermalsen in 1795. They were to the fore in the Napoleonic wars, in Egypt 1800-1, and at Corunna, serving through the Peninsular War, and were at Quatre Bras and Waterloo. They were in the Highland Brigade in the Crimea, and fought hard during the Indian Mutiny; later they served in Ashanti, and stormed the entrenchments at Tel-el-Kebir. During the First Great War many battalions of the regiment served in addition to the two regular battalions; one was noted for good work at Loos.

Territorial battalions of the Black Watch went to France with the 51st (Highland) division at the outbreak of the Second Great War, and were surrounded at St. Valéry on June 12, 1940, the few survivors being compelled to surrender. Fresh service battalions were



Blackwall Tunnel. Entrance to the subway for pedestrians and vehicles beneath the Thames, connecting Blackwall with E. Greenwich

raised, and the Black Watch joined the 8th army as part of the reconstituted 51st division. The regiment was the spearhead of Gen. Montgomery's infantry in the assault on the Mareth Line, and the regiment's storming of the Wadi Akarit was described as one of the most heroic achievements of the war. Other battalions fought in the Far East and took part in the invasion of the Continent in June, 1944. The regimental depot is at Perth.

Blackwater. Name borne by a number of rivers in the British Isles. The largest, the Blackwater of Munster, Ireland, issues from the border hills of Cork and Kerry, and flows 100 m. to Youghal Bay. Another Irish Blackwater rises in co. Tyrone and flows 50 m. to Lough Neagh. The principal Blackwater of England has its

source near Saffron Walden in Essex, and enters the North Sea at Mersea Island, after flowing a distance of 40 m.

Blackwater Fever. Acute complication of chronic malignant tertian malaria. It is characterised by a severe spontaneous destruction of red blood cells in the blood vessels, which results in the presence of blood-pigment in the urine. Fever, vomiting, jaundice, and anaemia are prominent. It occurs in tropical countries, particularly Africa, S. America, and parts of India.

While chill or excessive exertion may precipitate an attack, sometimes quinine taken as a cure for malaria would seem to do so. It has been suggested that this is due to the direct action of quinine on the blood corpuscles or, alternatively, that a biological lysin is formed; which, if either, of these theories is correct is unproved. Mepacrine is safer for purposes of prevention than is quinine in persons known to be subject to these attacks as a complication of malaria. Death may occur from kidney failure, the tubules of the organ becoming blocked with blood-pigment. The anaemia must be combated and the urine kept alkaline, as the pigments are more soluble in an alkaline medium.

Black Week. Popular name for the period Dec. 10-17, 1899, early in the S. African war, during which the British public learned of three serious reverses to the prestige of British arms at Magersfontein, Stormberg, and Colenso—thus receiving the first blow to assurance of easy victory over the Boers. One immediate result was the appointment of Roberts to supersede Buller as commander of the British forces in S. Africa. See South African War.

Blackwell, Elizabeth (1821-1910). British doctor, the first woman doctor. Born Feb. 3, 1821,

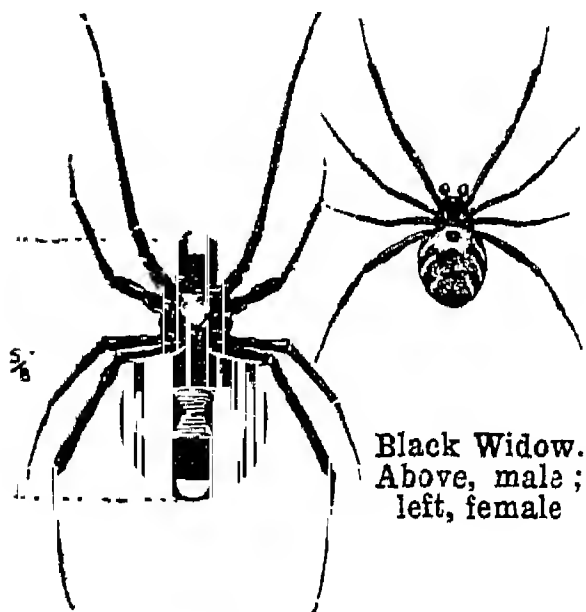


Elizabeth Blackwell, first woman doctor

at Bristol, she was taken to the U.S.A. at the age of 11. In 1838 she opened a school at Cincinnati, but, deciding to study medicine, then a closed profession to women, was admitted to the medical college at Geneva, New York, where she took her degree in 1849. She was the first woman to obtain a medical degree in any country. In 1851 she settled

down to practise in New York, where she established the New York infirmary for women. From 1868 she made London her home, having placed her name on the British medical register in 1859 while on a visit to England. There she helped to found, and taught at, the London school of medicine for women, dying at Hastings May 31, 1910. Her sister Emily (1826-1910) collaborated with her.

Black Widow. Name of species of venomous spiders of the genus



Black Widow.
Above, male;
left, female

Latrodectes, found in the Old and the New World, especially *L. mactans* of the West Indies and southern U.S.A. The female is black with a white spot ventrally, and sometimes eats the male after mating.

Blackwood. Timber of three Indian trees of the family Leguminosae. *Dalbergia latifolia*, common on the Coromandel and Malabar coasts, has leaves broken into a double row of leaflets, and white flowers in clusters. Its dark-purplish, close-grained timber is valuable for building, furniture, and carvings.



Blackwood. Flowers
and leaves of *Dalbergia latifolia*

Dalbergia sissooides is a smaller tree, but its timber is equally valuable. *D. sissoo*, found in Bengal and the Punjab, produces a durable dark-brown timber used for railway sleepers.

Australian blackwood, from *Acacia melanoxylon*, another genus of the Leguminosae, varies in colour from red-brown to nearly black and is an excellent cabinet timber.

Blackwood, ALGERNON (1869-1951). British author. A son of Sir Arthur Blackwood and Sydney, duchess of Manchester, he was educated at Wellington and Edinburgh university. After an



Algernon Blackwood,
British novelist
Histed

The Empty House, 1906, gave an indication of his extraordinary imaginative gifts, which in *John Silence*, 1908, he displayed to the full. His subsequent novels and stories revealed a powerful vein of mysticism and fantasy. The best-known included *The Human Chord*, 1910; *The Centaur*, 1911; *Pan's Garden*, 1912; *Ten Minute Stories*, 1913; *The Bright Messenger*, 1921; *Episodes Before Thirty* (autobiography), 1923; *Tongues of Fire*, 1924; *Full Circle*, 1929; *The Fruit-Stoners*, 1934; *The Tales of Algernon Blackwood*, 1938. In his last years he became a successful story-teller by sound and television broadcasting. He died Dec. 10, 1951.

Blackwood, WILLIAM (1776-1834). Scottish publisher. Born at Edinburgh, Nov. 20, 1776, he was apprenticed to a local bookseller. He became manager to a bookseller in Glasgow, and after some London experience started business in Edinburgh in 1804, beginning in 1816 as a general publisher. With John Murray he issued the first series of Scott's *Tales of My Landlord*. He was the principal founder of *The Edinburgh Encyclopaedia*, 1810-30, and, dying Sept. 16, 1834, passed on the business to his sons, Alexander and Robert. *Consult* *Annals of a Publishing House*, M. O. Oliphant and Mrs. Gerald Porter, 1897-8.

Blackwood's Magazine. A monthly periodical, familiarly known as *Maga*. It was established in Edinburgh in April, 1817, as a Tory rival to *The Quarterly Review*, by William Blackwood, who, taking control in October, changed the original title from *The Edinburgh Monthly* to *Blackwood's Edinburgh Magazine*. The number containing the famous satire of *The Chaldee MS.* (by James Hogg, J. G. Lockhart, and John Wilson) and

adventurous youth, when, among other occupations, he farmed in Canada, dug for gold, and ran an hotel, he became a journalist in New York. His first novel,



W. Blackwood,
Scottish publisher
Sir W. Allan, P.R.S.A.

a bitter attack (by Lockhart) on *The Cockney School of Poetry* laid the foundation of its prosperity. Among its distinguished contributors may be named Sir Walter Scott, De Quincey, John Galt, Sir Archibald Alison (the historian), Christopher North (John Wilson), Mrs. Oliphant, Bulwer Lytton, George Eliot, Anthony Trollope, Samuel Warren, David Masson, Joseph Conrad, Beatrice Harraden, Neil Munro, Alfred Noyes, and Ian Hay.

Bladder. Hollow organ which serves as a reservoir for the urine before it is discharged in the act of micturition. When empty the bladder lies entirely in the pelvis, but as it becomes distended it rises into the abdomen. Urine enters the bladder from the kidneys through two ducts, called the ureters, which open into the posterior part of the base of the organ; it leaves the bladder through the urethra. The neck of the bladder where it joins the urethra is surrounded by the prostate gland (*q.v.*). The bladder is covered with peritoneum except in front, and its wall consists of muscular and fibrous tissue supplied with blood-vessels and nerves and lined with mucous membrane.

The bladder may be attacked by various diseases, the most frequent of which is inflammation of the bladder wall, or cystitis. The commonest cause of acute cystitis is gonorrhoeal infection; other causes are the introduction of septic organisms from using a dirty catheter or other instrument, injury to the bladder, and exposure to cold, particularly in gouty persons. Chronic cystitis is caused by irritation of the walls of the bladder by calculi or deposits of gravel, tumours, foreign bodies, and ulceration. The condition is particularly apt to occur in elderly men in whom the passage of urine is restricted by compression of the neck of the bladder from an enlarged prostate gland.

The bladder may also become the seat of tuberculous disease or of cancer. Injury to the bladder may be caused by direct violence applied to the front of the abdomen, or may be a complication of fracture of the pelvis, or may result from over-distension.

Bladder Champion (*Silene cuculabus*). Perennial herb of the family Caryophyllaceae. A native of Europe, N. Africa, and W. Asia, it is common in cornfields and waste places and by roadsides. The whole plant is glaucous, and grows to a height of 6 in.-2 ft. The leaves are egg-shaped or oblong, in pairs, their bases joined around the stem; the

flowers are drooping, in a few-flowered panicle. The sepals are combined in a bladder-like calyx, and the five white petals are so deeply cleft as to appear ten.

Bladder-nut Tree (*Staphylea pinnata*). Shrub of the family Sapindaceae, a native of S. Europe. Its leaves are divided into five or seven smooth, oblong, saw-edged leaflets. The flowers are small and white, in drooping sprays. The seeds or nuts are contained in a bladder-like inflated capsule, are round and white, with the flavour of pistachio, oily, and slightly purgative.

Bladder Plum. Malformation of the fruit of the plum tree, caused by attack on the twigs of the tree of the fungus *Exoascus pruni*. This fungus extends into the ovary of the flower, causing the newly formed fruits to be much larger than healthy plums of the same age, and preventing formation of the "stone." They soon fade, shrivel, and fall from the tree. Branches showing the presence of the fungus should be cut off and burned.

Bladder Pod (*Vesicaria utriculata*). Perennial herb, member of the family Cruciferae. A native of S. Europe, it is about a foot high. The stems are clothed with oblong leaves and end in a cluster of four-petalled yellow flowers. The seed vessel is a round, inflated pod, the size of a pea.

Bladder Seed (*Danae cornubiense*). Perennial herb, member of the large family Umbelliferae. A native of S. Europe and Britain (Cornwall and S. Devon only), it has a spindle-shaped root and an

erect, branching stem, 1½ ft.-2 ft. high. The large radical leaves have long stalks and are twice or thrice divided into wedge-shaped segments with deeply cut edges. The small white flowers are in compound umbels, each petal with a long point turned over centrewards. The fruits are tiny bladders, each containing a single, loose seed.

Bladder Senna (*Colutea arborescens*). Shrub of the family Leguminosae. A native of central and S. Europe, it attains a height of about 10 ft. The leaf is broken into two rows of elliptic leaflets; the flowers are pea-like and yellow, about six in a spray. The leaflets are purgative, and are frequently mixed with those of the true senna.

Bladder Worm. Name given to the *Cysticercus* stage in the life history of the tapeworm. The egg, after being swallowed by a pig with its food, hatches out into a round embryo with hooks, which makes its way from the stomach to the blood-vessels and thence to the tissues of the muscles. It then passes into a dormant stage as a small cyst, which is known as the bladder worm. Pork thus infected is known as measly, and if it is eaten by a human being the cyst develops into a tapeworm, which attaches itself by hooks to the wall of the intestine. See Cestodes.

Bladderwort (*Utricularia*). Extensive genus of herbs, of the family Lentibulariaceae. They have irregular, two-lipped flowers. The aquatic species have the leaves divided into thread-like segments, to which are attached minute pitcher-like bladders (Lat. *utricula*-

lus). These have a movable valve across the opening, which allows small aquatic animals to enter but prevents their exit. The plant has no roots, but absorbs food from decomposed insect remains. Three aquatic species of bladderwort occur in ponds in the U.K.

Bladensburg. Village of Maryland, U.S.A. On the Potomac river, 6 m. by rly. N.E. of Washington, it was the scene of the British victory, Aug. 24, 1814, over the Americans, which led to the capture of Washington.

Blades, William (1824-90). British printer and bibliographer. Born at Clapham, Surrey, Dec. 5, 1824. He



William Blades,
British printer

served as an apprentice, and later was a partner, in his father's printing firm (Blades and East). He annotated Caxton's Governayle of

Hethhe, 1858, and wrote a number of books, including The Life and Typography of Caxton, with Evidence of His Connexion with Colard Mansion, the Printer at Bruges, 1861-63; Catalogue of the Books Printed by Caxton, 1865; Medals, Jettons, and Tokens in Connexion with Printers and the Art of Printing, 1869; Shakspeare and Typography, 1872; Enemies of Books, 1880. He died April 27, 1890.

Blaenau Festiniog or BLAENAU FFESTINIOG. Former town of Merionethshire, Wales, part of the urb. dist. of Festiniog (*q.v.*). At the head of the vale of Festiniog, it is a clean place built of slate and devoted to slate quarrying. Pop. (1951) 5,192.

Blaenavon or BLAENAFON. An urban dist. and market town of Monmouthshire, England, 6 m. N.N.W. of Pontypool by rly. It has coalmines, iron and steel works, and blast furnaces. Market day, Sat. Pop. (1951) 9,777.

Blagodats. Isolated peak on the E. slope of the Ural Mts., Russia. It has extensive layers of magnetic iron ore with 52-58 p.c. iron.

Blagoveshchensk. Capital of Amur region, R.S.F.S.R., in the Soviet Far East. On the Amur at its confluence with the Zeya, it is some 615 m. by steamer W. of Khabarovsk, and is an important railway junction. Iron-founding and flour milling are important industries, and a large trade in cereals, tea, and cattle is carried on, but the prosperity of the town is



Bladder. Organisms to which this name has been given: 1. Bladder Nut, *Staphylea pinnata*. 2. Bladder Plum: Left, exterior showing malformation; right, interior showing hollow and undeveloped stone. 3. Bladder worm, *Cysticercus*. 4. Bladder Pod, *Vesicaria utriculata*. 5. Bladder Seed, *Danae cornubiense*. 6. Bladder Senna, *Colutea arborescens*. 7. Bladderwort, *Utricularia*. 8. Bladder Campion, *Silene cucubalus*.

chiefly due to the proximity of goldmines. Pop. (est.) 60,000.

Another Blagoveshchensk lies in Bashkir A.S.S.R., about 30 m. N. of Ufa on the r. Belaya; its chief industry is the making of agricultural machinery.

Blaine, JAMES GILLESPIE (1830-93). American politician. Born at West Brownsville, Pa., Jan. 30, 1830, and educated at Washington College, Pa., he was a teacher 1848-54. A Republican, he was a member of Maine legislature 1859-62 (Speaker 1861-62) and a representative in Congress 1862-76 (Speaker 1866-76). He failed to secure presidential nomination in 1876 and 1880; nominated in 1884, he lost the election. Secretary of state, 1889-92, in Harrison's administration, he convened the first Pan-American conference, held in 1890, and brought the Bering Sea Question (*q.v.*) to arbitration. He died at Washington, D.C., on Jan. 27, 1893.

Blair, HUGH (1718-1800). Scottish divine. Born at Edinburgh, April 7, 1718, he graduated at the university in 1739, and from 1754 until his death was one of the chief preachers in Edinburgh. In 1759 he began a course of lectures in the university on composition, which became so popular that in 1762 a regius professorship of rhetoric and belles-lettres was founded to which he was appointed. An ardent champion of the authenticity of Ossian, Blair owed his fame to his Sermons (5 vols.), ed. J. Finlayson with biographical notices, 1777-1801; and Lectures on Rhetoric and Belles-lettres (2 vols.), 1783. He died Dec. 27, 1800.



Hugh Blair,
Scottish divine

Blair, ROBERT (1699-1746). A Scottish poet. Born at Edinburgh and educated at the university and in Holland, he was minister of Athelstaneford, East Lothian, from 1731 until his death, Feb. 4, 1746. His fame is based on one blank verse poem of 767 lines, *The Grave*, 1743. William Blake found in it inspiration for twelve of his finest designs.

Blair, ROBERT (d. 1828). Scottish inventor. In 1785 he was made professor of astronomy in Edinburgh university, but as there was no observatory the post was a sinecure, and Blair spent most of his time in attempts to find a new

glass suitable for telescopes. He succeeded, but the glass, called aplanatic because free from aberration, never came into general use. He died Dec. 22, 1828.

Blair Athol. Small town in Central District of Queensland, Australia, 20 m. N.W. of Clermont. It is a sheep and cattle-grazing centre, and in the local mines are worked gold, copper, and open-cast coal.

Blair Atholl OR **ATHOLE.** Parish and village of Perthshire, Scotland. It is at the junction of the rivers Tilt and Garry, 3 m. N.W. of the Killiecrankie Pass and 35 m. N.W. of Perth by railway.

Blair Castle, a fine specimen of Scottish baronial architecture, is the seat of the dukes of Atholl. Built in 1269 and restored in 1872, it was occupied by Montrose before



Blair Castle, the historic Perthshire seat of the Dukes of Atholl. The oldest part dates from 1269
F. W. Hardie

the battle of Tippermuir, and was captured and partially destroyed in 1653 by Cromwell's men. Graham of Claverhouse died here after Killiecrankie, 1689. It also sheltered the Young Pretender in 1745. Pop. (1951) parish, 1,868. See Athol, Duke of.

Blairstown and Rattray. Parish and police burgh of Perthshire, Scotland. It stands on both sides of the river Erich, 5 m. N.W. of Coupar Angus. It has flax, rayon, jute, and vegetable preserving factories, makes agricultural implements, and is the centre of an area growing raspberries and seed potatoes. Pop. (1951) 5,379.

Blake, EDWARD (1823-1912). A Canadian statesman of Irish descent. He was born at Adelaide, Ontario, Oct. 13, 1823. In 1867 he became a member of the first parliament of the Dominion, and in 1871 prime minister of Ontario. During 1873-78 he was a member of the Liberal cabinet and in 1880 leader of the opposition in the Dominion parl't. He settled in England as Nationalist M.P. for S. Longford, 1892-1907. He died in Toronto, March 1, 1912.

Blake, ROBERT (1599-1657). An English admiral. Born at Bridgwater, Somersetshire, in August, 1599, he was at St. Albans Hall and Wadham College, Oxford, from 1615 to 1625. M.P. for Bridgwater, 1640 and 1645, he commanded troops in the parliamentary armies, distinguishing himself by the capture and the defence of Taunton, 1644-45, which he held for nearly a year.



Robert Blake,
English sailor
Wadham College,
Oxford

In 1649 Blake was given command of the fleets of the Commonwealth. A royalist fleet had been organized by Prince Rupert. Blake drove him into the Mediterranean and destroyed many of his ships. He commanded the fleet in the Dutch war (1652-54), and proved himself more than a match for the great Dutch admirals De Witt, De Ruyter, and Van Tromp, owing his success in part to the excellent organization and administration of the Admiralty by Sir Harry Vane. In 1655, commanding a squadron

in the Mediterranean, he annihilated a Moorish fleet at Porto Farina, Tunis.

He achieved his most brilliant feat in 1657, completely annihilating a Spanish squadron in the port of Tenerife. He died four months later, Aug. 7, 1657, as his ship was entering Plymouth Sound on the return voyage. His body was buried in Westminster Abbey, whence it was ejected at the Restoration. Consult Life, D. Hannay, 1886; Robert Blake, R. Beadon, 1935; General Blake at Sea, C. D. Curtis, 1935.

Blake, WILLIAM (1757-1827). British artist and poet. Third son of a London hosier, he was born in London, Nov. 28, 1757. A visionary and mystic, as a child of four he "saw God put his forehead to the window," and at seven he spoke of a tree full of angels at Peckham Rye. Three years later, at

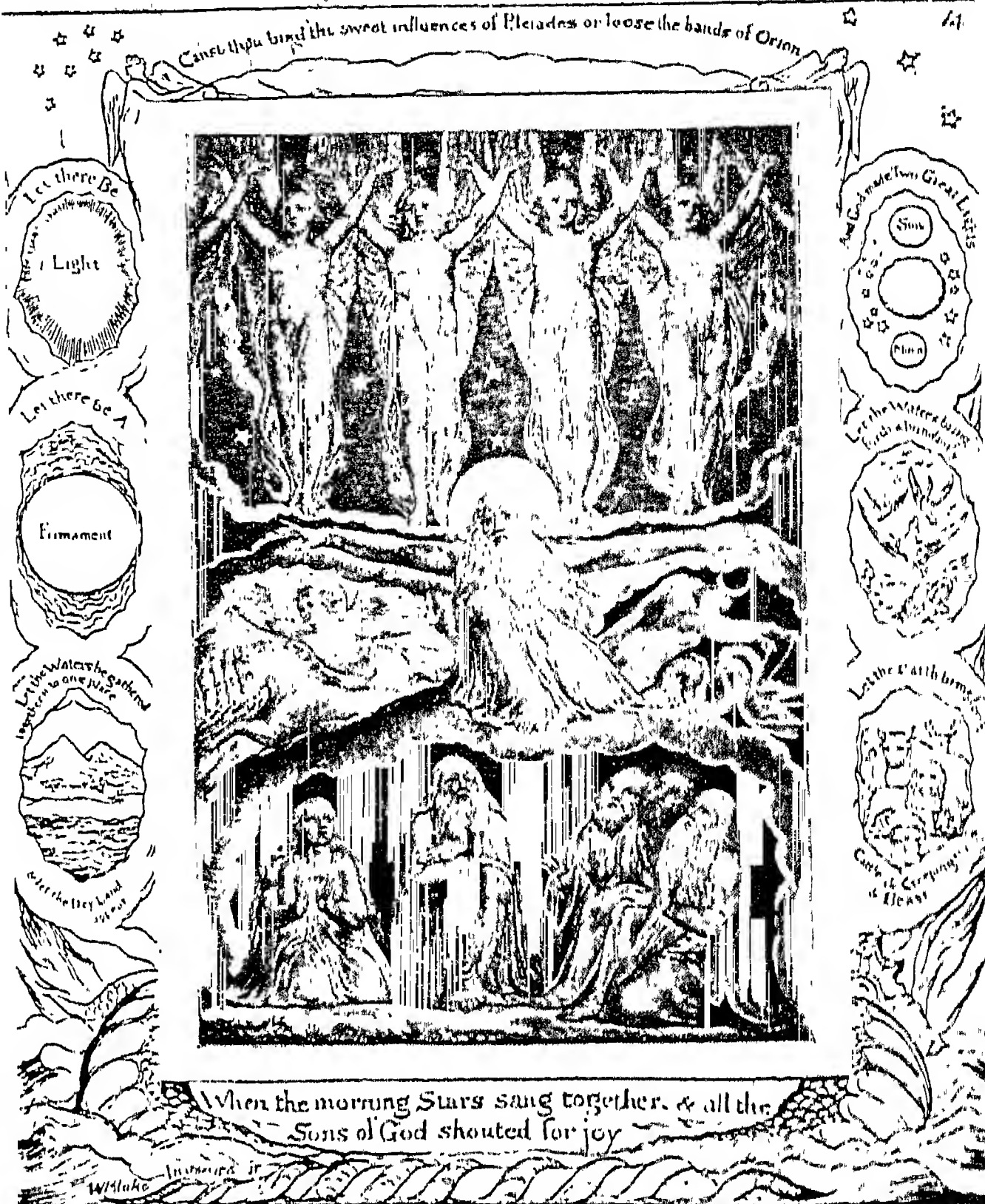


William Blake,
British artist and poet
T. Phillips, R.A.

the age of ten, he was attending a drawing school in the Strand, and during 1771-78 was an engraver. For a time he studied at the Royal Academy, but learnt little, finding, as he said, that natural objects weakened his imagination. In 1782 he married Catherine Boucher, an illiterate girl whom he taught to read and write, and from whom he received devoted assistance.

From 1784 to 1787 he kept a print shop in Broad Street, Golden Square. He exhibited at the Royal Academy in 1784, and in 1789 he was writing and decorating his immortal *Songs of Innocence*. These were followed in 1794 by the *Songs of Experience*. He was also at work on his *Prophetic Books*, evolving that complete symbolism, the key to which is largely lost. In those years, miserably poor, and detesting all business, he poured forth allegories, illustrations, poems, paintings. In 1790, the year of his *Song of Liberty*, Blake was a red-hot republican: and at the meeting of The Friends of Liberty he warned Thomas Paine against going home, although he hated Paine's religious views, and so saved him by twenty minutes from arrest by Pitt. The September Massacres in Paris, 1792, cured Blake of revolutionary ardour. Between 1793-1800 he lived at Hercules Buildings, Lambeth, finding recreation from the engravings he supplied to publishers in poetry and design.

About 1800 the poet Hayley persuaded Blake to go down to Felpham, in Sussex. Blake lived there for three years, doing a considerable amount of hack-work for Hayley, and then fled back to London. His designs (1804-5) for Robert Blair's *The Grave* were purchased by a publisher named Cromek, who treated him with less than common honesty. However, his mainstay was Thomas Butts, of Fitzroy Square, who steadily bought Blake's work at a guinea a drawing, admiring the man but baffled by his art. Butts's collection was sold by his descendants and formed the nucleus of the Blake group in the Tate Gallery. Blake exhibited for the last time at the Royal Academy in 1808. From 1813 John Linnell and a group of disciples commissioned his work, and it was for Linnell he executed his illustrations to the *Book of Job*. Blake died at 3, Fountain Court, Strand, Aug. 12, 1827. His 114 designs for Gray's poems, lost for more than 100 years, were found in the possession of the duke of Hamilton in 1919.



Blake. One of his highly imaginative and characteristic illustrations to the *Book of Job*, Blake's masterpiece, executed for John Linnell

Bibliography. *Poetical Works*, ed. J. Sampson, 1905 and 1913; *Blake's Vision of the Book of Job*, J. H. Wickstead, 1925; *Lives*: T. Wright, 1929; J. M. Murry, 1933; J. Bronowski, 1944.

Blamey, Sir Thomas Albert (1884-1951). Australian soldier.

Born at Wagga, N.S.W., Jan. 24, 1884, he was at first a teacher, but in 1906 enlisted. After training in India and England, he was attached to the Wessex territorials as a major when in Aug., 1914, he was summoned to join the Australian imperial forces in Egypt. He served in France, and was a brigadier-general at the end of the First Great War. Returning to Australia in 1919, he became deputy chief of staff. He was Australian military representative



Sir Thomas Blamey, Australian soldier

at the War office in London 1922-24. Retiring from the regular army in 1926, he was chief commissioner of police for Victoria 1926-36. He was knighted in 1935. In 1938 he became controller general of recruiting. Blamey was c.-in-c. Australian imperial forces in the Middle East 1940-41; deputy c.-in-c. Middle East 1941-42; c.-in-c. Allied land forces, S.W. Pacific, 1942-45. Having led the Australian reconquest of New Guinea, he was Australian signatory at the Japanese surrender in Tokyo Bay, Sept. 2, 1945. Made F.M. 1950, he died May 27, 1951. *Consult* Life, J. Hetherington, 1955.

Blanc, (Jean Joseph Charles) Louis (1813-82). French left-wing politician. Born at Madrid, Oct. 29, 1811, he went to Paris at the close of the 1830 revolution, penniless and full of ideals which he expressed in *Organisation du Travail* and *Histoire de dix ans*, the second also propaganda rather than history. When a new revolution broke out in Feb., 1848, he became a

member of the provisional government and insisted upon the creation of Ateliers Nationaux (*q.v.*)—which fell so far short of his expectations that he afterwards denied any responsibility for them. He was one of the few French leaders of 1848 to appreciate then the importance of Karl Marx. A few months later he had to fly to London, and did not return to Paris until Sept., 1870, when Napoleon III was a prisoner in Prussian hands.

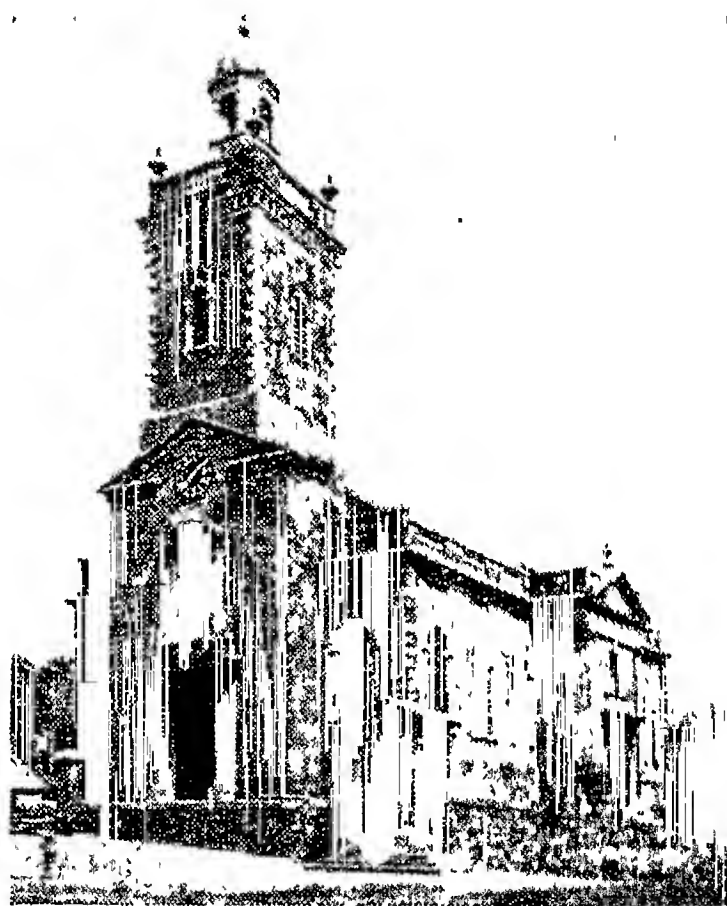
In the elections for the national assembly, 1871, Louis Blanc, who was against a premature peace, came first on the list in Paris. With the other Paris deputies and mayors (one of whom was Clemenceau) he refused to support the Commune. He continued active in political life until his death at Cannes, Dec. 6, 1882. He believed in absolute equality and could see no sense in liberalism; he advocated income tax, trade unions, disestablishment of the Church, and the secularisation of education.

Blanchard, GEORGES MARIE JEAN (1877–1954). French general whose gallant defence held off the German armoured attack while British and French troops escaped from Dunkirk, 1940. He had an excellent record during the First Great War, and in 1918 was a staff officer with Gen. Joffre. At the outbreak of the Second Great War he was G.O.C. the French 1st army. In May, 1940, he advanced into Belgium, and, on the death in a car accident of General Gaston Billotte (1875–1940), assumed command of the group of Allied armies of the North. The surrender of the Belgian army placed Blanchard's troops in an extremely dangerous position, and for his skilful conduct of the battle of Flanders he was made an hon. K.C.B. He was removed from the active list by the Vichy government, Aug., 1940. He died Nov. 22, 1954, at Neuilly-sur-Seine.

Blanchard, SAMUEL LAMAN (1804–45). British editor, friend of Thackeray, Lamb, Dickens, Browning, Leigh Hunt, Harrison Ainsworth, and Bulwer Lytton. Born at Great Yarmouth, May 15, 1804, he passed his early days in London, being educated at St. Olave's school, Southwark. He became a lawyer's clerk but, having made the acquaintance of Douglas Jerrold, turned to writing light verse and the editing of a succession of periodicals, *The True Sun*, *The Constitutional*, *The Court Journal*, *The Courier*. He died Feb. 15, 1845.

Blanc Nez. Cape on the N. coast of France. In the dept. of Pas-de-Calais, 6 m. W. of Calais, and the northernmost promontory on the French coast, it is the site of an obelisk erected to mark the services of the Dover Patrol in the First Great War.

Blandford Forum. Borough and market town of Dorset, England, commonly called Blandford. On the river Stour, it is 16 m. N.E. of Dorchester. It was severely damaged by fire in 1579, 1677, 1713, and 1731; only 26 houses



Blandford Forum. The parish church, built 1731–35 to replace the one which was burnt down in 1731

escaped the 1731 conflagration, after which Blandford was rebuilt as a whole and remains an interesting survival of an 18th-century town, virtually all the buildings being of that period. Alfred Stevens (1818–75), the sculptor, was born here. Market day, Thurs. Pop. (1951) 3,667.

Bland-Sutton, SIR JOHN (1855–1936). British surgeon who became a leading gynaeccologist. Born at Enfield Highway, April 21, 1855, he began as a pupil teacher, but saved enough to study medicine at a private academy. In 1878 he entered the Middlesex hospital, becoming assistant surgeon there in 1886 and surgeon in 1905. Knighted in 1912, and, created a baronet in 1925, he was president of the Royal College of Surgeons, 1923–26. His reminiscences, *The Story of a Surgeon*, appeared in 1930. He died Dec. 20, 1936.

Blanesburgh, ROBERT YOUNGER, BARON (1861–1946). British judge. He was born Sept. 12, 1861, at Alloa, and educated at Edinburgh Academy and Balliol College, Oxford. He was called to

the bar by the Inner Temple, 1884, and took silk, 1900. He frequently appeared before the house of lords and the judicial committee of the privy council. Promoted to the court of appeal and made a P.C. in 1919, he was a lord of appeal in ordinary, 1923–37, taking the life title Lord Blanesburgh on appointment. He served as principal British delegate on the Reparations Commission, 1925–31. He died at Winchelsea, Aug. 17, 1946.

Blankenberghe. Seaside resort of Belgium, in the province of West Flanders. On the North Sea, 9 m. N.W. of Bruges, it has a parade more than a mile long, an excellent bathing beach, and a casino. Originally a fishing village, it became a rival of Ostend as a bathing resort. Pop. (1947) 8,934.

Blanket. Specifically, a woollen bed covering; also coarse-spun woollen cloth, and mixtures of hair and cotton used as blankets.

There are three main varieties of wool blanket: (1) The raised blanket of the Witney type, in which a soft-spun and long-fibred welt is used; in the finishing process the fibres are raised to form a fleecy pile on the surface, so improving its warmth-retaining properties.

(2) The cloth or Bury blanket, woven from shorter wools and more finely spun than the Witney type; the fleecy pile is shorter than that of the Witney. (3) The twilled, or Ayrshire, blanket, rather like the Bury blanket in density of weave and woven in a diagonal twill pattern.

After blending, the wools for blankets pass through a shaking machine which removes the dust and grit, and then go to a willeying machine which opens the fibre and fully prepares it for the carding machine. In this the wool is dealt with by tens of thousands of small steel wires which assemble and mix the blended fibres and remove all foreign matter. The wool is then condensed, divided into strands or threads, and wound on to large bobbins preparatory to spinning. These large bobbins are put on to spinning mules, which reduce and twist the threads and wind them on to small bobbins preparatory to weaving. On the looms the thread is woven into long strips of blanket material, each strip making twelve pairs of

blankets. After weaving, the material, which at this stage is slightly open in texture, goes to the milling and fulling machines, which shrink it and give it an even texture and thickness. The material is next washed and bleached, and made ready for the raising machine. This consists of a revolving cylinder covered with fine steel wires, which draw out the fibres of wool from the surface and give the blanket a fleecy pile: the amount of raising determines the thickness of pile desired for the particular type of blanket being manufactured. The final stage of manufacture is to cut the length of material into six pairs of blankets and to bind or whip the edges of each blanket with silk ribbon or worsted. The coloured bands woven across the top and bottom of blankets are called headings.

Wool blankets are normally sold in pairs, consisting of two bed lengths finished at the ends. For trade purposes the weight is stated in pairs and the size is expressed per blanket. The most popular weights and sizes of blankets are as follows. 6 lb., 60 by 80 ins.; 7 lb., 85 by 63 ins.; 8½ lb., 70 by 90 ins.; 10½ lb., 84 by 96 ins. At one time gaudily striped blankets were popular, but now the trend is to produce coloured blankets in pastel shades.

Horse blankets and the blue, grey, and brown army blankets are made from closely woven wools and strong cotton fibres to give them greater strength and longer wear. Cheap blankets are usually woven from spoils and wastes, the by-products of the worsted industry, and skin wools removed from slaughtered sheep.

Special felted blankets are manufactured for numerous industrial purposes, including printing, paper-making, paper staining, and calico-printing. The principal blanket-weaving centres in Britain are at Witney in Oxfordshire, Bury in Lancashire, Dewsbury in Yorkshire, and in Ayrshire.

Blanketeers. Name given to a body of working men from Manchester who planned a march to London with a similar body from Derby, to present a petition for parliamentary reform. The party started from S. Peter's Field, Manchester, March 10, 1817, each man carrying a blanket for sleeping out on the way. The movement was suppressed by the government.

Blank Powder. Charge used for small-arms cartridges and for ordnance when the object is merely to make a report, as when

firing salutes, in mimic warfare, or in signalling. When smokeless powder is employed, as in military small-arms, the pressure is increased by using a powder which is only partially gelatinised, or by using a completely gelatinised powder in a state of fine division. The charge is confined by its envelope to increase the pressure, and, as this is high, there is considerable danger that an envelope slightly stronger than the normal, or a primer of abnormal efficiency, may cause dangerous pressures.

For use in machine-guns it is necessary to employ substantial wads or to reduce the bore of the muzzle in order to obtain sufficient recoil to work the gun. See Explosives; Gunpowder.

Blank Verse. Term applied in English literature to unrhymed verse written in iambic deca syllabic measure, i.e. in lines of ten syllables, in which every alternate syllable from the second to the tenth is stressed. The term is also used loosely sometimes of all verse the lines in which have blank or unrhymed endings.

The ordinary deca syllabic blank verse was first used in English by Henry Howard, earl of Surrey (d. 1547), in his translation of parts of Virgil's *Aeneid*. It was employed in 1557 by Nicholas Grimald, in a contribution to Tottel's Miscellany, and then by George Gascoigne in his satire, *The Steele Glas*, 1576. In dramatic writing it was first used by Thomas Norton and Thomas Sackville in *Gorboduc*, 1561. Its value for stage declamation was soon recognized, and other writers essayed it, but without special success, until the production of Marlowe's *Tamburlaine*, 1587, proved it a fine medium for poetic drama. Then Shakespeare imparted to it a flexibility and ease, and established it in effect as the only medium for the purpose in English. Towards the close of the 17th century there was a short-lived attempt to restore rhyme to the drama under Dryden's authority, but blank verse continued to be used by the greater number of English dramatic poets.

Apart from the drama, however, blank verse did not make any progress until the appearance of Milton's *Paradise Lost*, 1667, the first great poem to be written in the form, and marking an important stage in its development. In the 18th century the more important poems in blank verse included Thomson's *The Seasons*, 1726-30; Young's *Night Thoughts*, 1742-45; and Cowper's *The Task*, 1785.

In the 19th century Wordsworth, who used it in *The Prelude* and *The Excursion*, was perhaps the greatest master of blank verse. Southey used irregular stanza forms of unrhymed verse in *Thalaba* and *The Curse of Kehama*, and the regular form in *Roderick* and in *Madoc*. Tennyson wrote his *Idylls of the King* in blank verse, to which he imparted something of the lyric note. Robert Browning adopted it in many dramatic poems, and Elizabeth Barrett Browning in *Aurora Leigh*. Unrhymed hexameters were employed by Kingsley in his *Andromeda* and by Longfellow in his *Evangeline* and *The Courtship of Miles Standish*, and the latter used unrhymed trochaic octosyllabic lines for his *Hiawatha*. Walt Whitman in *Leaves of Grass* devised a new irregular kind of blank verse in variations of which, under the name of "free verse," many experiments are still made.

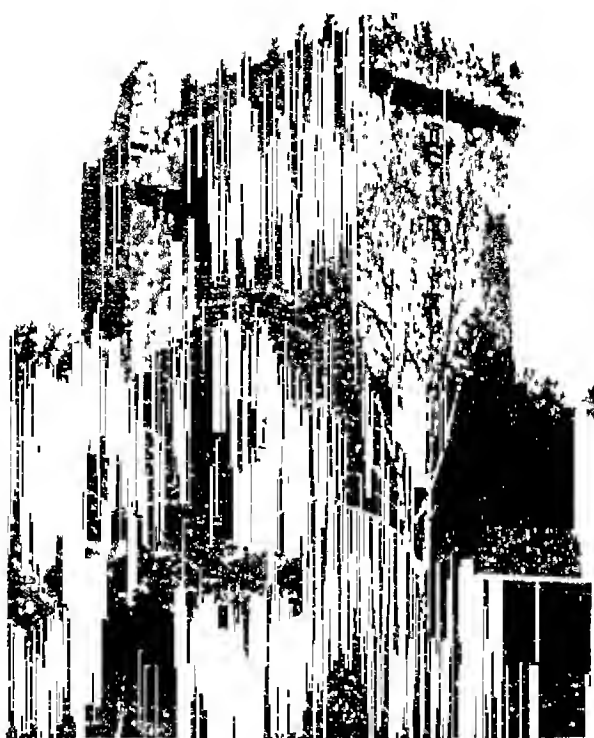
Blanqui, Louis Auguste (1805-81). French left-wing leader, a violent opponent of monarchy and of the parliamentary form of government. Born at Puget-Théniers, Feb. 8, 1805, he studied both law and medicine. As a youth he was associated with Carbonari conspiracies; then during the repressive period of Charles X's reign, 1824-30, worked for the *Globe*, a journal supporting the regime. The July revolution, 1830, disappointed him, and henceforth, when not in prison, he spent his time promoting violent revolutionary societies dedicated to the abolition of property and to the class war. For his part in the Commune, 1871, he was condemned to transportation, a sentence changed to imprisonment. In 1879, still in prison, he was elected deputy for Bordeaux and released. He died at Paris, Jan. 1, 1881. A man of sincere convictions, he achieved an immense prestige among the workers of his country that did not survive his death.

Blantyre. Parish of Lanarkshire, Scotland. It is 3½ m. W. of Hamilton, in a coalmining district. The parish contains High Blantyre, Low Blantyre, Auchintibber, and Stonefield, and has ruins of a 13th-century priory. Low Blantyre, on the Clyde opposite Bothwell, is noted for its cotton-mills. David Livingstone was born here and worked in a mill. The tenement in which he was born, with adjoining houses, has been made a national memorial, with a museum illustrating his career. Stonefield is a populous mining village. Pop. (1951) 17,769.

Blantyre. Town of Nyasaland, Central Africa. In the Shiré Highlands, 40 m. S.W. of Zomba, it is the h.q. of the South province. With its co-township Limbe, 5 m. distant, it constitutes the commercial centre of Nyasaland. Here are the high court of Nyasaland, and govt. hospital and schools. Limbe is the centre of the tobacco trade. Blantyre is well served by rly. and has an airport at Chileka, 12 m. N.

Founded by Scottish missionaries, 1876, and declared a township, 1895, Blantyre is the oldest European settlement in Nyasaland. Pop. Blantyre-Limbe (1952 est.) 20,900 (2,100 Europeans).

Blarney (Ir. *blairne*, small field). Village of co. Cork, Irish Republic,



Blarney, co. Cork. Top, the 15th-century castle. Below, preparing to kiss the Blarney stone in the parapet

7 m. N.W. of Cork. Its castle, founded 1446 by Cormac McCarthy, is famous for the Blarney stone, built into its walls. The kissing of this stone is said to confer the gift of persuasive eloquence.

Blasco Ibañez, VICENTE (1867-1928). Spanish author. He was born at Valencia, Jan. 29, 1867. His



V. Blasco Ibañez,
Spanish author
and politician

novels are contemporary documents of Spanish life, chiefly in Valencia, Malaga, and the southern provinces. They are realistic and analytical in treatment, with strong portraiture of modern types, and present the ideals of the intellectual and progressive Spaniard. He was an ardent revolutionary reformer. Notable among his novels are *The Cathedral* (1903), Eng. trans. Mrs. W. A. Gillespie, 1909; *Blood and Sand* (1908), Eng. trans. Gillespie, 1913, the story of a bull-fighter's career; and his re-

markable novel of the First Great War, *The Four Horsemen of the Apocalypse* (1916), Eng. trans. C. B. Jordan, 1918. He died Jan. 28, 1928. Some of his stories were adapted as films, and had a wide appeal.

Blasius (d. 316). Saint, bishop, and martyr. According to the legend, he was a bishop of Sebastē, Cappadocia, who suffered martyrdom under Licinius by being torn with an iron comb and then beheaded. He is nominated as the patron saint of weavers and wool-combers. Three churches in England are dedicated to him, and his name is in the calendar of the Book of Common Prayer. He was specially honoured in Yorkshire, and is commemorated in the Western Churches on Feb. 3, and in the Greek Church on Feb. 11.

Blasphemy (Greek *blasphemia*, evil-speaking). In English law, the publication of anything ridiculing or insulting Christianity, or the Bible, or God in the shape of any Person of the Holy Trinity. Its criminality consists in its likelihood to promote a breach of the peace and to subvert the government of the realm as a Christian community. At one time the courts often held that unorthodox arguments constituted blasphemy.

The real difference between blasphemous and non-blasphemous criticism of the Christian religion was stated by Lord Erskine in 1842. The one, he

said, was "scoffingly, or irreverently to ridicule or impugn" religion; the other, "soberly and reverently to examine and question the truths of the doctrines."

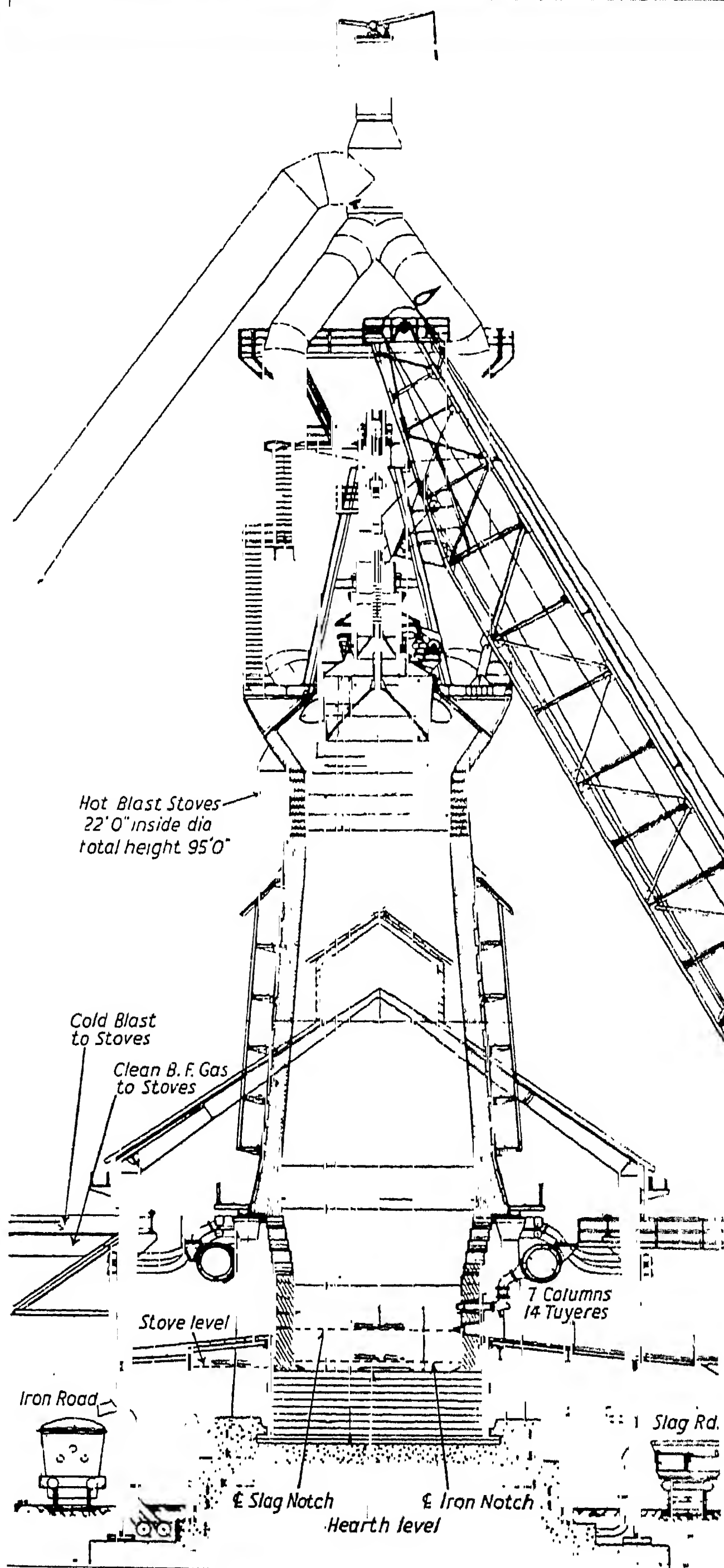
Blast. Term used for the effect of pressure waves resulting from an explosion in air or water. In the Second Great War it referred particularly to bombing effects on animate and inanimate objects. See Explosion.

Blast Furnace. As a furnace for producing cast iron or pig iron, the blast furnace dates from the 15th century, but its development was slow until about 1880, when the increased demand for steel brought about revolutionary changes in its design and size, thus leading to the modern furnace producing more than 1,000 tons of pig iron per day.

PRINCIPLES. The production of iron in the blast furnace depends upon the fact that if iron ore is heated to a high temperature in contact with carbon, it is reduced to metallic iron, which trickles down through the charge and collects in the hearth of the furnace, whence it is tapped and cast into the form of pigs. The fuel is either coke or charcoal, and the required temperature is attained by blowing preheated air through the hot charge, the process being practically continuous.

GENERAL DESCRIPTION. The modern blast furnace is a tall circular steel shell, 90 to 100 ft. high, lined with firebrick. The interior is of varying diameter and is divided into three main parts. The bottom, or hearth, is cylindrical in form and may be up to 12 ft. in depth and up to 30 ft. in diameter. Above the hearth is a section called the bosh, in which the iron becomes finally molten. This is an inverted frustum of a cone and extends up to 12 ft. above the top of the hearth. Then, in an upright position to a height of about 70 ft. is the stack, which, in the most modern constructions, is usually vertical for the first 5 to 10 ft. above the bosh and for about 10 ft. at its top. Rising above the stack is a structure designed to carry the top of the furnace, which comprises the charging mechanism by which iron ore, coke, and limestone are admitted to the furnace at regular intervals.

The bottom is a solid mass of high-grade firebrick up to 14 ft. in thickness, with a cheaper grade of firebrick underneath, the final foundation being concrete. The tapping hole or iron notch is



Blast Furnace. Diagram giving a sectional view of the main part of a blast furnace plant, showing the principle on which it works. The conveyor on the right brings up iron ore for smelting. The pipe on the left takes off waste gases for cleaning in dust catchers prior to use as fuel

Courtesy of John Miles and Partners (London), Ltd.

located 18 to 24 ins. above the furnace bottom and slants upwards towards the outer wall. Except when iron is being tapped off, this iron notch is closed by a fireclay mixture forced into it by means of a clay gun, pneumatically or electrically operated. The cinder notch is located above the iron notch and serves for periodic removal of the slag formed. Unlike the iron notch it is water-cooled, and is stopped by means of a tapered plug attached to a long iron bar, though some furnaces are provided with mechanically operated cinder notches.

The pipes through which a preheated blast of air enters the furnace are known as tuyeres, there being usually 10 to 16 symmetrically disposed around the circumference of the hearth just below the bosh line and about 2 ft. above the cinder notch. Each tuyere projects a little into the furnace and is water-cooled. It sits in a hollow, tapered ring known as the cooler, and against the inner tuyere rests a cast iron pipe called the blow-pipe, which in turn is supported by the tuyere stock. This connects the blow-pipe to the bustle pipe. The latter is an annular sheet-steel pipe lined with firebrick and serves to conduct the hot blast to the tuyere stock, its diameter being dependent upon the volume of blast required. It encircles the bosh about 12 to 15 ft. above the floor level and receives the blast from the hot blast main, which in turn conducts the blast from the hot blast stoves.

Avoidance of Air Pollution

In former days the top of the blast furnace was open and the waste gases were allowed to burn freely in the atmosphere. To avoid this waste, however, the top of the modern furnace is closed with a cone shaped bell and hopper (see diagram). This hopper holds the charge and when the second and smaller bell is opened, the charge of ore, coke, and flux falls on to the larger bell and is later dropped into the furnace without breaking the gas seal.

From the top of the furnace are pipes leading away the furnace gases. These pipes, known as the down-comers, take the gases to dust catchers for cleaning. The dust catcher is a vertical brick-lined cylinder of 15 to 30 ft. in diameter, filled internally with baffle plates. Its function is to

separate most of the dust in blast furnace gas, but as this dust contains ore, coke, and limestone it may be briquetted or sintered and returned to the furnace. If the gas is to be used as fuel it is then washed in either stationary or centrifugal washers, and after final cleaning may be used for heating the hot blast stoves, for raising steam in boilers, for driving gas engines, or may be mixed with coke-oven gas to provide fuel for steel-melting furnaces.

For preheating the blast, hot blast stoves are provided. The modern stove consists of a shell of riveted steel plates about 18 to 24 ft. in diameter and 80 to 130 ft. in height, lined with fire-brick. It consists of two parts, the combustion chamber and the checkerwork; the combustion chamber being an open vertical shaft in which the blast furnace gas is burnt, and the checkerwork being a mass of refractory brickwork acting as a means of preheating incoming cold air. When the checkerwork has reached the desired temperature, the gas and air are shut off and the cold blast enters in the opposite direction, thereby raising its temperature to about 700/750° C. To maintain a uniformly heated air blast three or more such stoves are provided, one heating up the cold air while the others are themselves being heated up.

Charging the Furnace

For charging the blast furnace mechanically operated hoists are now employed. These consist of inclined tracks or skipways, up which the weighed charge is hoisted in skips, these being automatically tipped and emptied into the hopper on reaching the top of the furnace. The general layout of the modern blast furnace plant is shown in the diagram in page 1209, part of the skipway being seen on the right.

At tapping time, the iron notch is opened and the molten iron on the hearth is either run into pig beds moulded in the sand of the cast house, or, as is more usual, is run through troughs or runners into ladles, which are then taken by locomotive to the steel-melting furnaces or to a pig casting machine. The slag coming from the blast furnace flows into slag cars and is taken to slag dumps, though some may be converted into ballast for rly. tracks and metal roads, or used in the manufacture of cement.

Pig iron analyses are shown in the Table at the top of the page.

ANALYSES OF DIFFERENT GRADES OF PIG IRON

Grade	Silicon p.c.	Sulphur p.c.	Phosphorus p.c.	Manganese p.c.
No. 1 Foundry	2.50-3.00	0.035 max.	0.5-1.0	1.0 max.
No. 2 Foundry	2.00-2.50	0.045 "	0.5-1.0	1.0 "
No. 3 Foundry	1.50-2.00	0.055 "	0.5-1.0	1.0 "
Malleable	0.75-1.50	0.050 "	0.2 max.	1.0 "
Bessemer	1.00-2.00	0.050 "	0.1 "	1.0 "
Basic Bessemer	1.00 max.	0.050 "	2.0-3.0	1.0 2.0
Basic (Open-Hearth)	1.00 "	0.050 "	1.0 max.	1.0 max.
Low Phosphorus	2.00 "	0.030 "	0.03 "	1.0 "
Mottled Iron	0.7	0.15	0.02-0.05	0.1-0.3
White Iron	0.3	0.20	0.02-0.05	0.1-0.3

In Swedish practice, charcoal is used as blast furnace fuel, and since the ores are of very high purity Swedish pig iron is characterised by low sulphur and phosphorus contents.

GAS ANALYSIS. While the composition of gas varies with the coke used and the operating conditions, the following analysis represents a typical gas produced by a blast furnace:

	Per cent
Carbon monoxide (CO)	24.5
Carbon dioxide (CO ₂)	12.0
Hydrogen (H)	1.2
Methane (CH ₄)	0.3
Nitrogen (N)	62.0

The calorific value of blast furnace gas is approximately 90 B.Th.U. per cu. ft.

OPERATING DATA. The lower Table shows the approximate weights of raw materials required, the weight of slag formed, and the volume of gas produced in making one ton of pig iron.

OPERATING DATA: ONE TON OF PIG IRON

Iron ore	..	..	..	..	3,350-4,350 lb.
Metallurgical coke	..	..	..	..	2,000-2,250 lb.
Limestone	..	..	..	..	750-1,100 lb.
Air (a) weight	..	..	..	..	7,750-8,900 lb.
(b) volume	..	..	..	..	100,000-115,000 cu. ft.
Slag formed	..	..	..	..	850-1,250 lb.
Gas produced (a) volume	..	..	..	..	100,000-150,000 cu. ft.
(b) weight	..	..	..	..	9,330-12,750 lb.
Dust extracted, approx.	..	..	..	..	200 lb.

PERSONNEL. As to the staff required for operating the blast furnace, this naturally depends to some extent upon its size and output. In the days of hand charging there were up to 36 men employed per shift for a furnace producing about 300 tons of pig iron per day, but in modern plants equipped with all mechanical aids and a pig casting machine, a total of 12 men suffices to produce up to 1,000 tons of iron per 24-hour working day. Each member of the team is assigned to specified duties. Thus for each shift, and in the bigger installations for each two to four furnaces, there is a general foreman or blower, who is placed in charge of all furnaces and ancillary

equipment. Each furnace has a keeper to supervise the tapping of the iron and slag, as well as to keep an eye on the condition of the furnace, both external and internal. The keeper usually has two or more helpers to assist in the general running of the furnace. In addition, the first helper looks after the skimmers and runners, and slag men are employed to take charge of the slag and its disposal. The hot blast stoves are tended by a stove tender; and a scale car man with several helpers or fillers are charged with the duties of handling the raw materials or stock. The whole team is supervised by a blast furnace superintendent; any lack of harmony among the workers composing the team inevitably leads to loss of output. *Consult The Making, Shaping, and Treatment of Steel, J. M. Camp and C. B. Francis, 1925; Blast Furnace Practice, R. Sweetser, 1939.*

Blasting. Operation consisting of breaking rocks by means of explosives which, when exploded in a confined space, suddenly generate a large volume of gas, thus exerting a tremendous pressure. Rocks may also be broken by using certain non-explosive substances which expand slowly under known circumstances; thus, the slacking of lime, the freezing of water, the swelling of dry wood when wetted, evolve intense pressure, and are used as substitutes for explosives in special cases. It follows that the fracture will occur along the line of least resistance. The results of blasting are influenced by the cohesive strength and structure of the rock; by the number and size of free faces,

whether the blast is fired alone or simultaneously with others; by the nature of the tamping, whether the broken rock falls or must be lifted by the blast; and by the size and shape of the hole containing the explosive.

Some rocks are tough and others brittle, while the structure may be massive, stratified, jointed, etc., and all these characteristics affect the results. With a massive rock, the débris from a blast may consist of small fragments, whereas a stratified rock may split along certain lines and yield large blocks. With jointed or fissured rocks, the results are sometimes disappointing, as the gases may enter fissures, reducing the pressure and consequently the amount of work done.

Simultaneous Blasting

The larger the area of free face the more easily a rock can be blasted, so that a rock free on all sides is the easiest to deal with. A blast beneath a flat surface, that is one free face, makes a conical hole having sides about 45° to the face, but if there is a second free face, the rock between the conical hole and the second free face can generally be removed at the same time, thus increasing efficiency. In mining work such as shaft sinking or driving levels, it is usual to produce a second free face at the time of blasting. This is done by making the centre holes incline to a point or line; and by exploding these holes first, either by using shorter fuses or igniting them first, a second free face is made. Simultaneous blasting is generally more effective than firing singly, as more rock between the holes is broken. This method is applied also to quarrying, and by simultaneously detonating small charges in holes, bored close together in the desired direction, large blocks are excavated. Simultaneous firing is accomplished either by means of an electrical machine or by devices using fuses of equal length.

Chief Explosives Employed

Two types of explosives are used—a low explosive fired by simple ignition and a high explosive which must be fired by a detonator. Gunpowder, which belongs to the former type, is very much slower in its action than a high explosive such as dynamite or blasting gelatine, and is used when comparatively soft material merely requires to be shaken and loosened. The action of high explosives is very rapid and has a greater shattering effect upon rock. Special explosives, called permitted

explosives, are used in coal and other mines where the danger exists of explosion of fire damp and air and of coal dust and air. With high explosives the detonator must be strong enough to explode instantaneously the whole of the charge, for if too weak, a portion of the charge may burn or remain unexploded with consequent loss of efficiency. Badly tamped holes are likely to produce poor results, as the tamping may be blown out like a bullet from a gun. When a blast can be placed so that the débris will fall by gravity, better results are obtained than when it must be lifted by the explosion.

The size of holes containing the explosive varies from that made by a hand drill to large chambers such as are used for military purposes and called mines. In ordinary mining operations, holes are usually 1 in.—2 ins. in diameter, while for large blasts in quarrying the holes may be even 6 ins. in diameter. Special shaped holes for splitting rock in a given direction may be made by special channeling tools, or circular holes may be enlarged in the desired direction by a reamer. Bulldozing consists of breaking loose rocks by detonating on the surface of the rock a charge of high explosives held in position by some earth or clay. See Explosives; Mining.

James T. Dixon

Blasting Gelatine. Powerful explosive consisting essentially of nitroglycerine gelatinised with nitro-cellulose. It was accidentally discovered by Nobel in 1875 through experimenting with nitroglycerine after he had cut his finger and treated it with collodion. It is used in practically the same form today and is the strongest known commercial blasting explosive. It is not hygroscopic and nitroglycerine does not exude under the action of water. It is safe to handle and is not very sensitive to shock and friction. As with all other nitroglycerine explosives made for use in Great Britain, blasting gelatine is now rendered "low freezing," some 20 p.c. of the nitroglycerine used being replaced by nitroglycol.

Blasting gelatine is manufactured by placing the dried collodion cotton in a fine state of division in a rubber-lined box and mixing it with the nitroglycerine by hand, after which it is allowed to stand for some hours and then incorporated in a machine, the mixture being heated to 45° C. by hot water circulation. Incorporation

lasts about an hour and the dough is then removed and formed into cartridges, either by pressing it into the cases with a plunger or by forcing it through a nozzle of the required size by an Archimedean screw working in a barrel. Blasting gelatine generally contains 8 p.c. of collodion cotton, about 1 p.c. of magnesium or calcium carbonate to stabilise it, and a trace of moisture, the difference being nitroglycerine. It is fired with a No. 6 detonator, but tends to harden and become less sensitive when kept.

Blastocyst. Stage through which all mammals (other than the egg-laying Monotremata) pass early in their development from the egg. The blastocyst is a hollow, thin-walled sac which in many species is spherical but may take other forms. It lies, at first, free in the uterus but later becomes attached to the uterine wall as a preliminary to the establishment of the placenta through which the foetus will later feed, excrete, and respire. At one place on the surface the wall of the blastocyst is thicker than elsewhere. This marks the first appearance of the embryo.

Blastoderm. Thin sheet of cells during the very early development of those animals which have eggs that are heavily yolk-laden, e.g. birds, reptiles, most fish, and most insects. The cells of the blastoderm may all be incorporated in the embryo later formed (as in fish) or may give rise both to the embryo and to temporary external structures (as in birds).

Blastoidea. Extinct class of Echinodermata. Their bodies were shaped like flower-buds and had well-developed stalks. They were sessile, and resembled the present-day Crinoidea. Knowledge of them is derived from fossil remains found in the Silurian and Carboniferous rocks of North America, and in the Devonian rocks of Europe.

Blastomere. Any of the first-formed cells resulting from the division of the egg of an animal.

Blastula. Stage through which most animals pass early in their development from the egg. At this stage the animal consists of many cells (from several dozen to several hundred according to species), but has yet to undergo those transformations in shape which give it some resemblance in form to the larva or adult it will later become. In many animals the blastula consists of a hollow ball of cells.

Blatant Beast. THE Monster described in books v and vi of Spenser's Faerie Queene,

possessing a hundred tongues and a sting; with its tongue it speaks of things "most shameful, most unrighteous, most untrue"; and with its sting "steeps them in poison." Successfully muzzled by one knight, it broke free and became the object of a fresh quest. It is generally regarded as symbolising calumny. Spenser seems to have invented the word *blatant*.

Blatchford, ROBERT PEEL GLANVILLE (1851-1943). British journalist and author. Born at Maidstone, March 17, 1851, of parents on the stage, he learned brush-making, and then joined the Dublin Fusiliers, retiring as a sergeant, 1878. Becoming a clerk in Northwich, he drifted into journalism and joined the staff of *Bell's Life* in 1884 and of the *Sunday Chronicle* in 1885. In 1891 he founded *The Clarion*, a socialist weekly.

Gifted with a remarkably lucid and attractive style, Blatchford, by his writings—notably *Merrie England and Britain for the British*—made many converts to socialism. He also published stories of army life, of which *Tommy Atkins of the Ramchunders* and *A Son of the Forge* are the best; two volumes of controversial secularism, *God and My Neighbour*, 1903, and *Not Guilty; a Plea for the Bottom Dog*, 1905; and his autobiography *My Eighty Years*, 1931. After his wife's death in 1921, he became interested in spiritualism. He died Dec. 17, 1943.

"Blattnerphone." Trade name for a system of magnetic sound-recording. Invented 1900 by the Danish scientist Valdemar Poulsen (1869-1942), it was adopted by the B.B.C. in 1930, but was superseded by other systems.

Blavatsky, HELENA PETROVNA HAHN (1831-91). Russian-born American traveller, founder of the



Madame Blavatsky, married in 1848 the much older Nicephore Blavatsky, from whom she soon separated. During the next twenty years, according to her own account, she travelled in Canada, Texas, Mexico, and India, and made two attempts to penetrate into Tibet. In 1870 she became a

prominent spiritualist in the U.S.A., where she was naturalised and lived for seven years; there, with Henry Steel Olcott (d. 1907), she founded the Theosophical Society, Nov. 17, 1875.

With considerable knowledge of Eastern literature derived from translations, she wrote extensively on esoteric subjects, and persuaded her many followers that she was inspired by communications from spiritual beings of Tibet called *mahatmas*. In 1877 she published *Isis Unveiled*, and in 1888 *The Secret Doctrine*, works mainly compiled from unacknowledged sources. After further travels in India she resided in London, where she died May 8, 1891, in St. John's Wood. *Consult* *Incidents in the Life of Mme. Blavatsky*, ed. A. P. Sinnett, 1886; *A Modern Priestess of Isis*, V. S. Solovev, trans. 1895.

Blaydon. Urban dist. and market town of Durham, England. It stands on the Tyne (navigable to this point), 5 m. W. of Newcastle by railway. A suspension bridge spans the Tyne, connecting the town with Newcastle. Situated in a colliery district, it carries on ironfounding and the manufacture of chemicals, fire-bricks, glass bottles, and sanitary appliances. Blaydon gives its name to a county constituency. Blaydon Races is the title of a favourite Tyneside song. Market day, Sat. Pop. (1951) 30,791.

Blazon (Fr. *blason*, shield, coat of arms). The art of describing in proper heraldic terms a coat of arms or a complete achievement. The chief laws are the following. The tincture of the field must be mentioned first, then the principal charges, ordinaries, and sub-ordinaries, followed by common charges and their respective tinctures. The charges are described in the following order: those in chief (top part of shield), in the fess point (middle), on the dexter (heraldic right), on the sinister (heraldic left), and in base (lower part). Then follow the description of a chief or canton with its charges, next of a shield of pretence, if any, then marks of difference, and finally the external ornaments. Repetition must be avoided; hence the custom of never mentioning a tincture twice in one description, but referring to it later as "of the first," of the "second." See *Heraldry*.

Bleaching. The process of whitening materials, especially fabrics, by washing and exposure to light, or by chemical means. The natural method of bleaching

is to expose the articles to the action of air, light, and moisture, this with scouring being the process employed by the ancients, and still used to a considerable extent in industrial bleaching. The process for whitening the finest linen involves, for example, the exposure of the fabric laid on grass to the action of light and air for several days. The ultra-violet light present in sunlight causes, in presence of moisture (dew), formation of hydrogen peroxide, which causes the actual bleaching. The fading of dyed articles (carpets, curtains) is due to the same cause. Bleaching various articles with concentrated ultra-violet light has been tried, but these processes are uneconomic. Beeswax and castor oil are bleached by exposure to light.

The chemical agents used are either oxidising agents, such as oxygen, ozone, hydrogen peroxide, permanganate, dichromate, or chlorine; or reducing agents such as sulphur dioxide (burning sulphur fumes), sulphites, or hydrosulphites. Chemical bleaching is much quicker than air bleaching, but needs very careful chemical control.

The choice of a bleaching agent is determined by experience. Chlorine, for example, is used for cotton and linen fabrics, but it is ineffective for wool, for which either sulphur dioxide or hydrogen peroxide is used. Chlorine is used to make wool "unshrinkable."

Cotton, bleached as yarn, thread, or cloth, is subjected to a series of processes which begin with boiling the cotton in water, to remove soluble impurities, and the charred fibres left after singeing. The cotton cloth is then boiled in alkali to remove the natural wax, pectin, and other impurities. The alkali used is either milk of lime and soda ash (lime boil) or caustic soda (caustic boil), and the treatment is given under high pressure in special pressure vessels (Kier boiling). The cotton is then passed through a bleaching powder or chlorinated soda solution, and left folded in piles for a period determined by experience. It is then washed thoroughly, and if bleaching powder has been used, a dilute acid treatment is given. Centrifuging ("whizzing") and drying follow.

Linen is more difficult to bleach than cotton, on account of the presence in the fibres of larger amounts of pectic acid and fatty matter. More thorough treatment

with alkali is needed, and in the highest-class goods the chlorine bleach, which is the same as for cotton, is followed by several days "grassing," that is, laying on grass in a field. Close control of linen and cotton bleaching by special tests is necessary, as over-bleaching destroys the strength of the cloth. Sodium hypochlorite (chlorinated soda) is also used as a bleach during laundry washing of cotton and linen garments.

Wool contains much more fatty matter than cotton and linen, but this fat (lanolin) is more easily removed. A "scouring" treatment is used, the wool being moved by metal forks through troughs of warp soap and soda ash solution, then through warm and cold water. The actual bleaching process used is usually "stoving," that is, exposing to the fumes from burning sulphur in special machines. Hydrogen peroxide is also used.

Silk does not require true bleaching: even in the bright yellow Italian silks the colour is all in the outside "gum" layer which is removed by soaking in almost boiling soap solution. This "degumming" process is carried out after the silk has been woven into fabric, and the silk so treated is white, soft, and lustrous.

Shantung fabrics are made from a brown "wild" silk, and are properly bleached by natives by a kind of "grassing" process, but many shantungs are now bleached chemically instead. Tussah silk is bleached with dilute hydrogen peroxide solution, made faintly alkaline with sodium silicate (water-glass).

Straw for hats is bleached by "stoving" with sulphur dioxide.

Paper pulp is whitened with a solution of bleaching powder or chlorinated soda, the strength of the bath varying from 7 to 15 p.e., according to the origin of the pulp. Wood pulp requires the strongest solution. The bleaching liquid is removed by washing the pulp, or neutralising the residual chlorine with an anti-chlor, such as sodium sulphite.

Other special bleaching processes are those employed for hair, bone, and ivory, in which hydrogen peroxide is the agent used. The effect upon the hair is to produce a golden-yellow colour. Bone for tooth-brush handles and for similar uses, and ivory for piano keys are bleached by leaving the bone or ivory for several days in a warm bath of hydrogen peroxide. For bleaching palm oil, an acidified

potassium dichromate solution may be used; or in more modern methods, the oil is heated in vacuum until decolorised. Sponges are best bleached by means of a permanganate bath containing an acid, although when a very light-coloured sponge is required sulphurous acid is used. Flour is whitened by exposing it to the action of nitrogen peroxide. Electrified air is also employed, but in view of the allegations that changes affecting digestibility are produced in the flour by these means, it is doubtful whether such bleaching should be allowed.

Bleaching Powder. Material for removing colour from cotton and cloth stuffs and paper. It is usually prepared by impregnating cold slaked lime with chlorine gas.

It was first manufactured on a large scale in Glasgow in 1799. It is decomposed and rendered useless by damp or sunshine, but is soluble in water. It has an important part in the making of chloroform (*q.v.*), and is a disinfectant.

Bleak (*Alburnus lucidus*). Small fish, often called the fresh-water sprat. About 5 ins. long, it may be seen in most rivers playing in shoals at the surface. It is rather delicate eating, but too small to be of much value except as bait. Its scales were used for the internal coating of imitation pearls.

Bleak House. Charles Dickens's ninth novel, and one of his longest. Published in monthly parts, March, 1852 Sept., 1853, with 40 illustrations by Phiz, it is largely a scathing indictment of delays in the court of chancery, woven into a complex and highly dramatic plot. Of the 67 chapters, 31 purport to be the personal narrative of the heroine, Esther Summerson. The characters, some of the best known in the Dickens portrait gallery—such as Chadband, Snagsby, Turveydrop, Tulkinghorn, Mrs. Jellyby, the Smallwoods, Mr. Guppy, Harold Skimpole (based on Leigh Hunt), Lawrence Boythorn (based on W. S. Landor), the crazed Miss Flite, and Jo the crossing sweeper—represent extraordinarily diverse walks of life; yet all are connected directly or indirectly with the central theme, the interminable chancery suit of Jarndyce *v.* Jarndyce, and thereby with each other. The scenes are laid in Hertfordshire, Lincolnshire, and familiar streets of London.

. **Bledisloe**, CHARLES BATHURST, 1st Viscount (b. 1867). British politician and administrator. He was born Sept. 21, 1867,

at Lydney Park, Gloucestershire, and was educated at Sherborne, Eton, and University College, Oxford. He became a barrister in 1892, and was M.P. for Wilton div. of Wiltshire, 1910-18, and parliamentary secretary, ministry of Agriculture, 1924-28. He was governor-general, New Zealand, 1930-35. He was created a baron 1918, and a viscount 1935.

Bleeding. Treatment, also called blood-letting, venesection, phlebotomy, at one time much used for all kinds of complaints of the body. It is occasionally found useful, *e.g.* when there is much engorgement of the lungs with blood and consequent difficulty in breathing, and in certain conditions of the heart in which that organ is not sufficiently powerful to maintain the circulation. The blood is usually drawn from a vein at the bend of the elbow, the median basilic vein. The 19th-century method of allowing leeches to attach themselves to the skin and suck blood is no longer used in British practice.

Blekinge. Smallest län or county of Sweden, bordering the Baltic. Known as the Garden of Sweden, it covers an area of 1,164 sq. m., and is rich in forests and salmon-streams. For several centuries it belonged to Denmark, and did not become Swedish until the treaty of Roskilde, 1658. The cap. is Karlskrona. Pop. 147,250.

Blemmyes, or BLEMMYES. Hamitic nomads, who entered the Nile valley above Assuan in early Egyptian history. Fabled by classical writers to be headless, with faces in their breasts, they harassed the later Roman emperors, Diocletian being forced to appease them by tribute and grants of territory. Finally the emperor Marcian's general Maximin (A.D. 453) imposed a hundred years' peace, on the expiration of which Justinian withdrew their treaty privileges. Driven into the eastern Nubian desert, they have remained there as the Beja (*q.v.*).

Blende or ZINC BLENDE. Common name for the chief ore-mineral of zinc, zinc sulphide, more correctly called sphalerite (*q.v.*). See also Pitchblende.

Blending. Process of combining different types of the same article to produce a desired mixture. Such commodities as tea, whisky, sherry, tobacco, and snuff are blended with a view to imparting flavour or aroma and also uniformity. Formerly tea was not blended until it reached the retailer. See Tea.

Blenheim. Military aircraft of the twin-engine mid-wing monoplane type supplied originally to the R.A.F. in 1937. A small force of home-based Blenheims carried out the first bombing raid on Germany in the Second Great War, a few hours after the outbreak. This machine also formed part of the Advanced Air Striking Force which went into action in France in 1939. Designed as a medium bomber, it was later modified to serve as a long-range fighter, and on becoming obsolete was finally changed into an operational training machine. It was powered with Bristol Mercury air-cooled radial engines which together provided 1,680 h.p. The crew consisted of pilot, bomb-aimer/navigator, and wireless-operator/air-gunner. In its Mark IV form the Blenheim was armed with five machine-guns, one in the wing, two in a mid-upper turret, and two under the nose firing to the rear. Blenheim aircraft were in action in N. Africa, India, and Burma. The main dimensions were: span, 56 ft. 4 in.; length, 42 ft. 9 in.; height, 9 ft. 10 in. The speed was 266 m.p.h. and the maximum range was 1,900 m. The makers were the Bristol Aeroplane Co.

Blenheim. Seat of the duke of Marlborough, in Oxfordshire, England. Near Woodstock, it formerly had its own rly. station (closed 1953). The palace of Woodstock, associated with Fair Rosamond, and the scene of Scott's novel, Woodstock, formerly stood in Blenheim Park, which received its name when granted to the duke of Marlborough as a reward for his victory at Blenheim in 1704. The magnificent mansion was designed by Sir John Vanbrugh, and towards the cost of its erection a grant of £500,000 was made by Parliament. It was famous for its valuable paintings (many the work of Rubens), and its splendid collection of gems, most of which were sold towards the end of the 19th

century. Sir Winston Churchill was born here. The park, area 2,503 acres, is 12 m. in circuit. Consult Blenheim Palace, D. Green, 1952.

Blenheim. Borough of Marlborough county, New Zealand. At the N. end of South Island, it is near the coast on the navigable Wairau, and on the rly. from Picton to Ward. There are large gold-reef mines in the neighbourhood. Pop. (1951) 7,051.

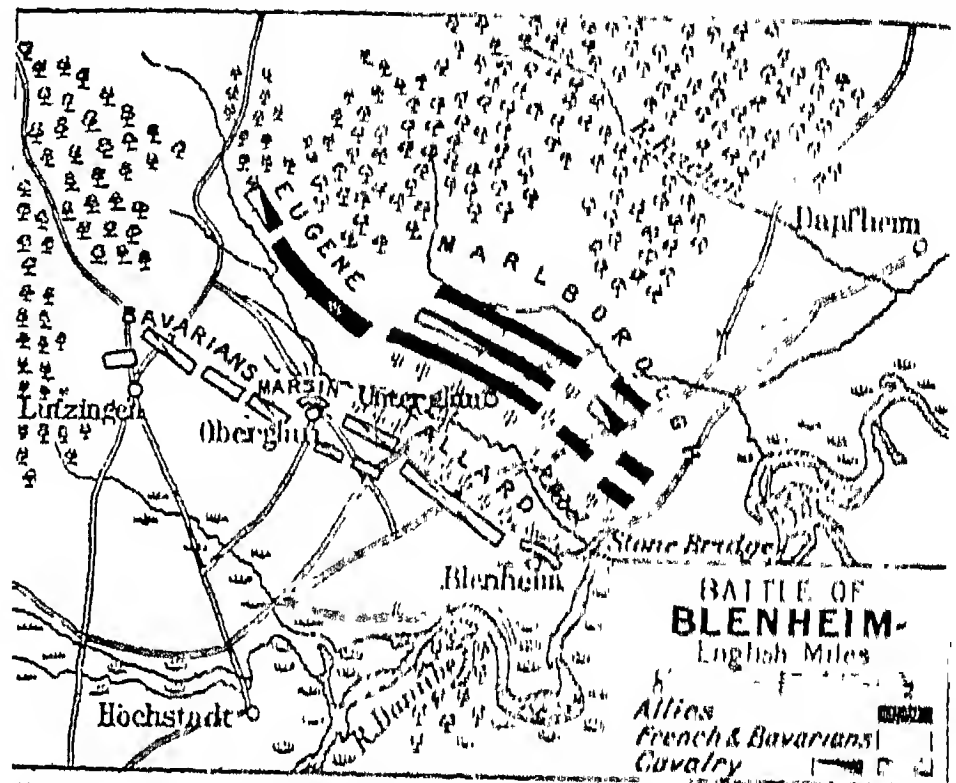
Blenheim, BATTLE OF. Victory gained Aug. 13 (N.S.), 1704, by the English, Austrians, and their allies over the French and Bavarians; one of Creasy's fifteen decisive battles. The War of the Spanish Succession was raging, and the French plan of campaign for 1704 was to send an army to unite with the Bavarians, and then to march down the Danube and capture Vienna. Marlborough, who was in the Netherlands, and the Austrian general, Eugene of Savoy, decided to strike at Bavaria.

Marlborough left the Netherlands in May, and, marching along the Rhine valley, was joined as arranged by several contingents of German troops. The French and Bavarians, under Marshals Tallard and Marsin, joined forces at Augsburg, and the rival armies met around a village near Höchstädt, known as Blindheim, but more commonly today as Blenheim.

The contending armies were small professional bodies opposing each other in long lines, punctuated with cannon that were little used. The two armies began to deploy early in the morning, and had hardly completed their leisurely

arrangements by noon. The French right rested on Blenheim itself, and on the Danube which flowed past it; the village they had fortified. The English and Austrians had their right protected by woods. Between the two armies a small stream, called the Nebel, flowed, and the length of line was about three miles. The armies converged together on the plain in the angle between the Danube and the Nebel.

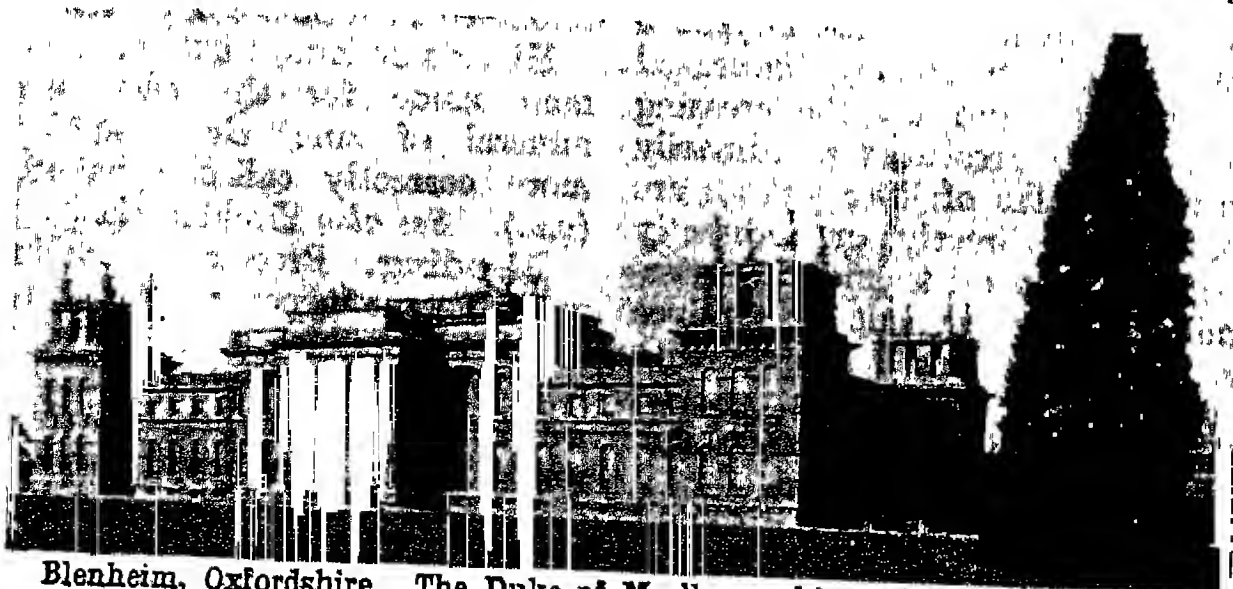
The battle opened about 1 p.m., when Marlborough sent some of his



Blenheim. Positions taken up by Marlborough and by the opposing French and Bavarians in the battle of Aug. 13, 1704

troops against Blenheim. They reached the defences of the villages neither firing nor being fired at, but once there the French took a heavy toll of them, while the foremost English regiments tore at the palisades. The attack was a failure, although successes were gained by some English horsemen who came up to help.

Soon Marlborough, noticing that the French had concentrated their strength on the right, surmised that they were weak in the centre. Ordering the attack against Blenheim to be maintained as a feint only, he turned his attention to the vulnerable point. He called up his cavalry, who crossed the Nebel where a stone bridge carried the high road over the stream, and where four military bridges had been constructed. The French seized the moment when the English troops were in disorder after crossing, and their cavalry went through Marlborough's lines more than once. It was now 5 p.m. Marlborough had sent about 6,000 Hanoverians against the Bavarians, who held a strong point at Oberglaun, a small village between the armies; these also were driven back in disorder, and their commander was captured. Marshal Marsin, in command of



Blenheim, Oxfordshire. The Duke of Marlborough's seat, built by Sir John Vanbrugh. It was opened to the public in 1950

the Bavarians, took advantage of this success to launch cavalry against the shaken troops.

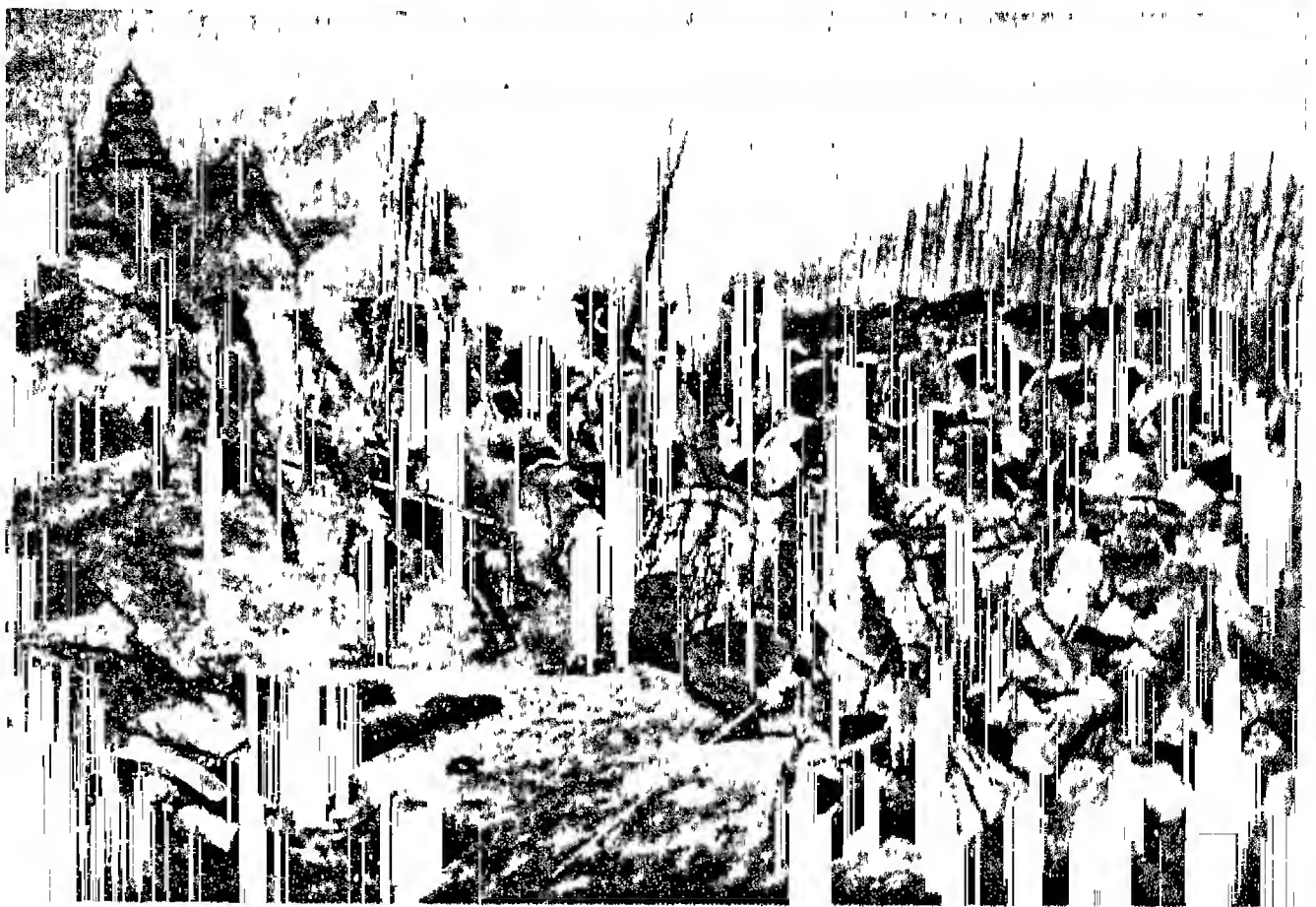
Marlborough now put himself at the head of a brigade of Danes to meet the French cavalry, and called on Eugene for assistance. Eugene, whose task was to hold the Bavarians, had suffered a check, but he hastened to the succour of his colleague with some cuirassiers, who arrived in the nick of time and fell upon the flank of the French horse, saved the Danish brigade, and so restored the battle. It was now 6 p.m.; little daylight remained, but at last all Marlborough's troops were over the Nebel. Again the French infantry opened fire, but the cavalry hesitated to charge.

The moment for the counter-stroke had arrived, and Marlborough's cavalry struck home. They routed the French horse, broke up the line of infantry where the French joined the Bavarians, and drove these allies asunder. Neither from Blenheim on his right, nor from Marsin on his left, could the French general Tallard gain help in time; he was himself taken prisoner. Marlborough advanced on Blenheim and cut off the retreat of the large garrison there. The Bavarians had made haste to escape, so he took only one-third of the guns and 11,000 prisoners.

The Franco-Bavarians numbered about 50,000, of whom 15,000 were cavalry. The English and their allies were about equal to this strength, but they had at least 25,000 cavalry. They lost about 11,000, the French and Bavarians many more. The estate in Oxfordshire given to Marlborough by the nation in honour of this victory was named Blenheim (*q.v.*). Consult England Under Queen Anne: Blenheim, G. M. Trevelyan, 1930; Marlborough, W. S. Churchill, 1933-38.

Blinkinsop, JOHN (1783-1831). British inventor. An agent for some collieries in Yorkshire, his native county, he turned his attention to the question of obtaining power for hauling coal from the mines. In 1811 he patented a new locomotive moved by means of cog-wheels which fitted into a specially prepared track. On a trial journey, in 1812, it pulled a number of coal wagons with complete success. It was then used regularly for hauling coal, and George Stephenson modelled his first locomotive upon it. Blinkinsop died Jan. 22, 1831.

Blenny (*Blennius*). Group of small fishes, including some 40



Blenheim. R. Caton Woodville's stirring picture of the advance of the English against the French who were established behind the palisaded defences of the village

species, mostly of very small size and common in many parts of the world. Most are marine, but a few inhabit fresh waters. They have tentacles above the eyes.

Blériot, LOUIS (1872-1936). French airman. He was born at Cambrai, July 1, 1872, and was trained as an engineer at the École Centrale des Arts et Métiers. In 1906 he founded the first aircraft factory in France and shortly afterwards took up flying. On July 25, 1909, he



Louis Blériot, French airman

flew from Baraques, near Calais, to a field inland of Dover Castle in a 600-lb. monoplane with a 25-h.p. Anzani engine, the first man to fly the Channel in a heavier-than-air machine (*see illus. in p. 127*). Adolphe Pégoud (1887-1915), first man to loop the loop, 1913, did so in a Blériot machine. During the First Great War Blériot produced a number of military aircraft, and a few years before he died, Aug. 1, 1936, claimed to have designed 300 different models and built not fewer than 10,000 aeroplanes. In 1927 he planned a trans-Atlantic air mail service via the Azores.

Blessed Damozel, THE. Lyric poem in 24 six-line stanzas, by Dante Gabriel Rossetti, written about 1847. It was first published in *The Germ*, in 1850, and underwent much revision before inclusion in the poet's collected writings. One of his earliest poems, and perhaps his finest,

Rossetti twice (1876, 1879) made it the subject of a painting.

Blessington, MARQUERITE, COUNTESS OF (1789-1849). Irish author. Born at Knockbrit, co. Tipperary, Sept. 1, 1789, she was married when only 14 years old to a Captain Farmer, from whom she was separated in three months. Distinguished for beauty and wit, in 1818, four months after Farmer's death, she married the earl of Blessington. With him, Count D'Orsay, and others, she set out on a Continental tour in 1822. At Genoa she met Lord Byron and became his intimate friend.

Returning to London, the countess contributed numerous poems and stories to the magazines, published several novels, and gathered at her soirées the most distinguished men of the time. Lord Blessington died in 1829, and in 1836 his widow took Gore House, Kensington, where she resided with Count D'Orsay until, in 1849, they were compelled to flee from their creditors to Paris, where she



The Blessed Damozel. How Rossetti depicted the spiritual figure of his own poem



Countess of Blessington, Irish author, wit, and friend of Byron
After A. E. Chalon, R.A.

died June 4. Her *Conversations with Lord Byron*, 1834, provides the most authentic account of Byron's opinions to be found outside his own journals and letters.

Bletchley. Market town and urban district of Buckinghamshire, England. It stands on the Ouzel, 17 m. S.W. of Bedford, and is a railway junction. Bletchley has brickworks, brush factories and light engineering works, and trades in agricultural produce. Market day, Thurs. Pop. (1951) 10,919.

At Fenny Stratford, which is within Bletchley, is the church of S. Martin, built in 1724, where celebrations held on S. Martin's day include the firing of curious small cannon called "Fenny poppers."

Blewits. Two species of gill-bearing edible fungi (Basidiomycetes) which are sometimes confused. The field blewits, *Tricholoma personatum*, occurs mainly in meadows where it frequently forms "fairy rings"; *T. nudum* is a woodland species sometimes called wood blewits. The cap of both species is thick and fleshy and may be up to five inches in diameter, rounded when young, but becoming flattened in maturity. The cap of *T. personatum* is tan or buff-coloured; that of *T. nudum* is lilac when young but becomes reddish-brown. The stems of both fungi are about three inches long, thick, blue-lilac in *T. nudum* and whitish with fine lilac-coloured lines in *T. personatum*. The gills of *T. nudum* are lilac, those of *T. personatum* are dirty white, becoming tinged with pink or lilac colour. In both species the gills do not extend to the edge of the cap. *T. personatum* is used by dyers for the extraction of a blue pigment. It has several other names besides blewits, e.g. blue stocking, blue button, blue stalk. See Fungus colour plate.

Blida. Town of Algeria. It stands at the foot of the Little Atlas Mts., 32 m. by rly. S.S.W. of Algiers. The Oued el Kebir, on which it stands, has been harnessed for electric power and irrigation of the surrounding land. Noted for its orange groves, Blida does a large trade in citrus fruits, early fruits and vegetables, herbs, cereals, and wool. It also has flour mills. Built in the 16th century on the site of a Roman station, it was damaged by earthquakes in 1825 and 1867. Pop. (1954) 56,799.

Bligh, WILLIAM (1754-1817). British admiral, navigator, and administrator. Born Sept. 9, 1754, the son of Cornish parents, he entered the navy, sailed round the world with Captain Cook, 1772-74, and took part in the relief of Gibraltar under Howe, 1782. In 1787 he was appointed to the command of the *Bounty*, when it was sent to the South Seas to fetch specimens of the bread-fruit tree. Resentful at having to leave Tahiti after six months there, and of Bligh's overbearing temper, his crew mutinied and on April 28, 1789, set him with 18 men adrift in the Indian Ocean in an open boat. In seven weeks he navigated it to Timor—an extraordinary feat. In 1791 he took the bread-fruit from Tahiti to the West Indies. Afterwards he was present at the battles of Camperdown, 1797, and Copenhagen, 1801.

Appointed governor of New South Wales in 1805, he came into collision with his civil and military subordinates and, though supported by the British government, was imprisoned for two years, and sent back to England in 1810. Promoted rear-admiral in 1811, vice-admiral, 1814, he died Dec. 7, 1817. Consult Lives: G. Rawson, 1930; H. S. Montgomerie, 1937.

Blighy. Soldiers' word for home. Long used by the British army in India, the word came into general use during the First Great War. It has been explained as a corruption of Hindustani *vilayati* or *bilayati*, meaning near the borders of a district, hence foreign, or of the adjectival form of Arabic *vilayat*, province, a term often used by a foreigner for his native province, and hence for home.

Blimbing. Acid fruit resembling a small cucumber. It is produced by a small tree, *Averrhoa bilimbi*, of the family Oxalidaceae, much cultivated in the hotter parts of India, but of unknown origin. The tree attains a height of 10 to 15 ft., and has compound leaves

similar to those of the ash, with five to ten pairs of leaflets, and reddish-purple flowers produced direct from the trunk. The fruits are preserved in syrup, pickled, or candied. An allied species, the caramba (*A. carambola*), is larger.

Blimp. Word coined in the First Great War when British lighter-than-air craft were divided into A-rigid, and B-blimp (i.e. without rigid internal framework). The barrage balloon in the Second Great War was classed as a blimp. The famous die-hard character, Colonel Blimp, was originated by the cartoonist David Low (q.v.) in 1934. Low said in 1955 that he intended the character not primarily as an attack on the military mind, but to expose the "double-think" mentality common in the period of its invention.

Blind, CARE OF THE. In the U.K., persons coming within the statutory definition of blindness—"so blind as to be unable to perform any work for which eyesight is essential"—are required to be registered. The number so registered varies; but in any given year there are on the register in England and Wales 85,000 90,000 persons over 16 and 2,000 2,500 children under 16 requiring education "by methods not involving the use of sight." In Scotland the number is something under 10,000, and in Northern Ireland about 2,600. The Blind Persons Act, 1920, placed upon the state and local authorities (county councils and county borough councils) responsibility for the care of these persons, which they carry out in close cooperation with national, regional, and local voluntary agencies. This responsibility was re-affirmed and amplified in the National Assistance Act, 1948.

CHILDREN. There are in the U.K. some 600 blind children under five. Home teachers of the blind, under the direction of the local authority, visit and help the parents of such children in their training. Where a child cannot be satisfactorily cared for at home, he may be admitted to one of nine residential nursery schools under the direction of the Royal National Institute for the Blind, two of which are for retarded children.

The education of blind children aged 5-16 was made compulsory in England and Wales in 1893, in Scotland in 1890; it is also compulsory in Northern Ireland. The first school for the blind was opened in Liverpool in 1791; schools were opened in Bristol and in Edinburgh a short time

afterwards. Schools are residential and the education given conforms as closely as practicable to that in a school for the seeing. Braille is used for reading and writing. Apparatus is used to assist in the teaching of such subjects as arithmetic and geography; and stress is laid on handwork, in order that the child may acquire manual dexterity. Physical education and, where necessary, remedial gymnastics play an important part in the curriculum.

As in schools for the seeing, there is a break at the age of 11 plus, the child of average ability then passing from a junior to a senior school, to continue his education on the same general lines as before. The boy or girl of promise goes on either to a senior selective school or to a grammar school for the blind. At the senior selective school, general education is continued up to the age of 16 and is succeeded by training in piano-tuning, shorthand and typing, or some branch of music. At the two grammar schools, one for boys and one for girls, general education normally continues up to the age of 18, in preparation for entrance to a university or for training in a profession.

The blind child who is also deaf, crippled, maladjusted, retarded, or suffering from mild epilepsy may receive education between the ages of eight and 16 at a residential school belonging to the Royal National Institute for the Blind. For the mentally defective blind child, provision is made by the ministry of Health under the National Health Service Act, 1946.

For the blind boy or girl who leaves school at 16 or 18, the education authority usually offers training and retains responsibility for such training until the young person is 21.

THE ADULT BLIND. For those who lose sight in adult life, responsibility for pre-vocational rehabilitation, should this be required, vocational training, and subsequent employment rests upon the ministry of Labour, under the Disabled Persons (Employment) Act, 1944. Blindness, especially when of sudden onset, generally invokes considerable mental and emotional shock, as the newly blinded person realizes that the whole of his life must be re-oriented. A realization of this fact during the Second Great War, when many civilians lost their sight from enemy action, led to the

establishment of three residential rehabilitation centres in England and Wales, later reduced to two; a centre in Scotland was opened in 1952. At these centres, when hospital treatment ends, the newly blind may have a period of pre-vocational or social rehabilitation to help them readjust their lives.

Manual or semi-manual employment of the blind may be in one of 64 sheltered workshops carrying on the following trades: making of baskets, brushes, mats, mattresses, wire goods, wood-work, chair-caning, piano-tuning, shoe-repairing, round and flat machine knitting, weaving. Trained workers who live at a distance from a workshop can be given employment in their homes, receiving materials at cost price and being paid at piecework rates, plus augmentation of wages. Their work is supervised and they are assisted in marketing their goods.

During the Second Great War, many blind people were absorbed into open industry, working side by side with the seeing, and proving themselves capable of carrying out a wide variety of operations. This was stimulated by the passing of the Disabled Persons (Employment) Act, 1944, which



Blind: various aspects of training. 1. Boot-repairing class at St. Dunstan's. 2. Girl working in a motor assembly shop. 3. Pupils of Worcester College for the Blind giving a display in the gymnasium. 4. Braille shorthand machine in use. 5. Basket-making. 6. Blind boys in a geography class, using embossed globes and maps

Photos, 1 and 4, courtesy of St. Dunstan's; 2, 3, 5, and 6, courtesy of the National Institute for the Blind

required employers having a substantial number of workers to employ a quota of disabled persons, and continued in many instances after the war years. Research into possible new occupations for the blind goes on continually.

Professional and semi-professional occupations in which well-educated and fully trained blind persons have shown themselves competent include physiotherapy, the ministry of the church, law, school teaching, home teaching of the blind, music, public administration, telephony, and shorthand and typing.

GENERAL WELFARE. Of the blind population, about 80 per cent. are over 50 years of age, 50 per cent. are over 70. Blindness is thus specially associated with old age, and it is the duty of those responsible for the welfare of the blind to make the lives of the older blind financially secure, and as full of active interests as their physical powers allow.

The Blind Persons Act of 1920 gave blind persons in need a non-contributory pension at 50 (later at 40), similar to that then received by seeing persons at 70, and subject to the same means test. National assistance grants are paid to blind persons at a higher rate than to the seeing, in recognition of their heavier living costs.

The National Assistance Act, 1948, requires that blind persons shall be given instruction "in their own homes or elsewhere in methods of overcoming the effects of their disabilities," and also that recreational facilities shall be provided for them. Qualified home teachers, numbering about 700, visit the blind in their homes, see that they are in receipt of pensions and allowances, teach them to read embossed type, arrange for them to obtain books on loan from the National Library for the Blind, teach them pastime handicrafts and help them to dispose of their finished goods, arrange social gatherings for them, and try in every way to brighten their lives. Home teachers must pass an examination set by the College of Teachers of the Blind, which also conducts examinations for school teachers, craft instructors, and piano-tuners.

Privileges enjoyed by blind persons in addition to those already named include the right to use a dog as guide without payment of a licence (many blind persons avail themselves of the services of specially trained guide-dogs); certain travel facilities when travel-

ling by rail, sea, or road; permission to vote by post in parliamentary and local elections or alternatively to have the help of a seeing friend to mark their ballot paper; special postal rates for transmission of Braille and apparatus; and the right to own a radio set without payment of a licence. Many avail themselves of the talking book service (*see below*).

In order that local authorities and voluntary agencies (schools, workshops, societies providing specialised services, and voluntary agencies for the general welfare of the blind) may work in co-operation, England and Wales is divided into four regions, and regional associations act as co-ordinating bodies for the discussion of all matters of mutual concern, collect and collate statistics, carry out certain services which are for the benefit of all, and are centres of information on matters relating to blind welfare. These regional associations are voluntary bodies, with the elasticity and initiative which this implies. In Scotland the Scottish National Federation performs much the same functions but does not compile statistics; the federation is represented or consulted in matters relating to acts of parliament affecting the blind of Scotland.

The position of the blind in the British colonies is very different. In 1946 a team of three investigators was sent to Africa and the Near East by a committee appointed jointly by the Colonial office and the Royal National Institute for the Blind. Their report led to the formation of the British Empire Society for the Blind in 1950. It showed that upwards of a million people in the colonies were blind, and millions more were suffering from eye diseases which might result in blindness. Little had been attempted to alleviate their lot, or to provide them with education, training, or employment.

Through the initiative of the British Empire Society, blind welfare schemes were initiated in 26 colonial territories, new schools and training centres were planned, and existing schools were improved. Surveys in the interests of prevention of blindness were launched in Kenya, Aden, and West Africa. In West Africa two teams (one ophthalmological, the other entomological) got to work and produced information that promised to help in reducing the incidence of blindness. The results of a tour

of East Africa by an experienced worker for the blind were reported to the governments of the East African dependencies. A tour of the British West Indies by the director of the society in 1954 led to the establishment of a regional office there, set up with the aid of the Canadian National Institute for the Blind.

All over the world, in the U.S.A., the overseas countries of the British Commonwealth, and elsewhere, work for the prevention of blindness and the relief of those who suffer from it increases steadily. Elsewhere, as in the U.K., the effects of the Second Great War had an influence. In 1949 an international conference of workers for the blind convened by the American Foundation for the Blind and the Royal National Institute for the Blind, with the participation of the United Nations and U.N.E.S.C.O., led to the establishment of a world council for the welfare of the blind representing some 40 countries.

Mary G. Thomas

MECHANICAL AIDS. Various electronic guiding and reading aids have been developed for the blind. The essential requirement of a guiding device is that with its aid the blind person should be able to walk at a moderate speed, either indoors or outdoors, and receive warning of the position of any obstacle within a distance of 6 ft. The aid should be light in weight and easy to hold. All such instruments depend upon the reflection of light, ultrasonic, or sonic waves from the obstacle.

In one guide aid, a beam of light explores space over a distance of several hundred feet. It incorporates a lens to produce an image of any illuminated object, the exact position of the image depending upon the distance of the object. The image space is explored by a rotating spiral comb and when coincidence between image and comb teeth occurs, the light-chopping effect produced is picked up on a photo-multiplier tube and converted into audible signals of varying pitch.

Ultrasonic and sonic guide aids indicate the distance of the object by the time elapsing between the transmission of a pulse of energy produced by a suitable pulse-generator and its return after reflection. Transmission and reception are marked by audible clicks in earphones. One such instrument, called a "clicker," is little larger than a hand torch. It contains a sound source which is

reflected back by the detected obstacle, the reflection being received by the "clicker" and amplified to give the user audible warning.

Electronic reading aids can be divided into two classes: those in which the user has to associate an audible note, modulated in some way connected with the form of the printed letter, with that letter; and those where the instrument itself recognizes the letter and provides the letter sound. In one example of the first type, a stylus, held in the hand, contains an oscillating mirror and provides a fine pencil of light. When a book is scanned with the stylus, an audible note is emitted as the beam passes over black print but not when it is passing over the white background. In the second type of device, a number of parallel beams of light scan the line of print and produce signals from the reflected light in a photo-multiplier tube. These signals are correlated in a series of matrices which then select a magnetic recording of the appropriate letter and reproduce it in a loudspeaker. The device, which is highly complicated, permits reading at speeds up to 60 words per minute. But the average blind person finds it easier to learn to read Braille. *See also* St. Dunstan's.

For the causes of blindness, *see* that heading.

Blind Harry (d. c. 1592). *See* Henry the Minstrel.

Blindness. Loss of perception of light, colour, and form. It may be congenital, due to imperfect development of the eyeballs, or acquired. Acquired blindness may be due to injuries or to diseases of the globe. Injuries may be of two forms, one, perforating, frequently complicated by the lodgement of a foreign body within the organ and consequent infection, and the other concussive, from a blow, with detachment of the retina or other internal injury.

Ophthalmia neonatorum, or ophthalmia of the newly born, is a notifiable disease in England and Wales. It is defined as a purulent discharge from the eyes of an infant, starting within 21 days of birth, and is caused by an infection during or shortly after birth, in 40 p.c. of cases of gonorrhoeal origin. With a view to preventing the occurrence of ophthalmia neonatorum and consequent blindness, it is highly desirable that an infant's eyes should be cleansed scrupulously

immediately after birth. Treatment with penicillin and sulphadiazine improves the prognosis.

The majority of diseases of the globe are inflammatory, and are caused by infection of the conjunctiva. This infection may occur as part of an injury, but more commonly arises without any definite lesion or by spread of inflammatory processes from the surrounding parts. Inflammation in an injured eye occasionally sets up sympathetic ophthalmia in the uninjured eye, the eventual loss of vision in which may be greater than in the injured eye.

Glaucoma, characterised by increase of the intra-ocular pressure, and often without any known cause, is a common source of blindness if left untreated. Embolism (plugging) or thrombosis (clotting) of the central artery of the retina, or thrombosis of the retinal vein, is a cause of blindness arising suddenly, and is due to the obstruction in the blood-supply to the retina. Degeneration of the retina (retinitis pigmentosa) is a less frequent cause. Loss of useful vision may be caused by ulceration and subsequent scarring of the cornea (leucoma), or by opacity of the lens (cataract).

Atrophy of the optic nerve is usually preceded by optic neuritis (inflammation of the nerve), and may arise from many causes, principally tumours of the brain, including abscess, cyst, tubercle, and syphiloma. Other causes are fractures of the skull, meningitis, including tubercular and cerebrospinal meningitis, hydrocephalus, extension of inflammatory processes within the orbit, syphilis, lead poisoning, and occasionally a fever, *e.g.* measles, scarlatina, typhoid fever, malaria.

Severe haemorrhages from the stomach or other organs may give rise to incurable blindness. Bright's disease and diabetes may lead to considerable loss of sight by causing changes in the retina. Infective ophthalmitis may be due to the plugging of a retinal artery by a septic embolus, and may occur in septicaemia.

Vision may be affected seriously by the excessive use of tobacco or wood alcohol (toxic amblyopia). Twist and shag tobaccos appear to be the most toxic, but all pipe tobaccos and cigars may produce the condition. Cigarettes apparently are harmless in this connexion. A serious form of blindness may ensue from the drinking of methylated spirit or from inhaling its fumes. Functional loss

of vision sometimes occurs in hysteria.

The subjects of night blindness see well in daylight, but their vision in a poor light falls far below that of persons of normal sight. Occasionally night blindness is hereditary, but long exposure to very bright lights may be a pre-disposing cause.

An oculist should be consulted without delay where there is sudden agonising pain in the eyeball, or where lights are seen to be surrounded by a coloured rim or halo, or where vision fails rapidly and it is found necessary to increase frequently the strength of any lenses which may be worn.

The Corneal Grafting Act, 1952 (*see under* Cornea), makes it legal for the eyes of a deceased person to be used in suitable cases for the treatment of a blind person. For other steps taken to help the blind, *see* Blind, Care of the.

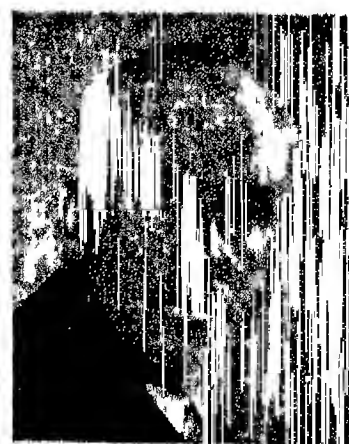
Blind Spot or Optic Disk. Name given to a circular patch on the retina of each eye which is insensible to light and colour. It is about 1.8 millimetres across, and is at the entrance of the optic nerve. Its blindness was discovered by Edme Mariotte in 1668.

Blind Storey or TRIFORIUM. In medieval architecture, the middle storey of a church, placed between the clerestory above and the arcade below. It is called a "blind storey" because it contains no windows.

Blind-worm or Glow-worm (*Anguis fragilis*). A limbless lizard of the family Anguidae. It occurs throughout Europe, N. Africa, and W. Asia. The body is worm-like and the eyes are so small that the animal is popularly supposed to be blind. It is about 1 ft. long, of brownish colour, has

a very brittle tail, and feeds on slugs and insects, usually by night. Its bite is harmless.

Bliss, Sir ARTHUR (b. 1891). British composer, a Master of the Queen's Music. He was



Sir Arthur Bliss,
British composer

born in London, Aug. 2, 1891, and was educated at Rugby and Pembroke College, Cambridge. Early works, such as his piano quintet, 1920, and Colour symphony, 1922, revealed his interest in dissonance. The symphony Morning Heroes, 1930, with speaker.

and chorus, in honour of those who fell in the First Great War, was outstanding. He composed music for many ballets of which *Checkmate*, 1937, and *Miracle in the Gorbals*, 1944, were the best known. His opera *The Olympians* was produced at Covent Garden, 1949. He wrote much film music, *e.g.* for *Caesar and Cleopatra*, and he arranged *The Beggar's Opera* for a film in which Sir Laurence Olivier played Macheath, 1954. He wrote a piano concerto, played by Solomon, for the New York World Fair in 1939. Knighted in 1950, he was appointed Master of the Queen's Music, in 1953.

Blister. Vesicle containing watery material produced beneath the cuticle or superficial layer of the skin by scalding or contact with an irritant substance. Blistering was formerly used in medicine to relieve pain and congestion, the drugs most often used being cantharides and turpentine.

Blister Bar. When steel is made from wrought iron by the cementation process, bar iron is packed in cast iron boxes with charcoal and heated in a furnace to about 950° C. for 7 to 11 days. During the process, blisters form on the surface of the metal, these being due to the expansion of the soft iron by gas formed and liberated. After cooling, the bar produced is known as "blister bar," which is then hammered or rolled out into "plated bars" or "bar steel." These plated bars are then piled and forged together to make "shear steel," or remelted and cast into moulds as "crucible cast steel." See *Metallurgy*; *Steel*.

Blister Beetle. Popular name for the Cantharidae family, of which the best known is the mis-called Spanish fly (*Lytta vesicatoria*). It is common in S. Europe, but rarely occurs in Great Britain. Golden or bluish green in colour, it is found on the oak, elder, and privet. Its pulverised dried elytra yield the drug cantharidin.

Blister Gases. War gases which cause burns on unprotected skin and lung irritation when inhaled. The most important are mustard gas (dichloroethyl sulphide) and lewisite (chlorovinyl-dichlorarsine). Mustard gas was

first used by the Germans in July, 1917, and produced a higher rate of casualties than any other war gas. Lewisite, an American invention, was developed too late for use in the First Great War. Compounds other than mustard gas and lewisite which have vesicant properties and are suitable for use as war gases include the group known under the general title of "nitrogen vesicants" or "nitrogen mustards." These compounds are stated to be more rapid in action than mustard, if less drastic, with an immediate effect on the respiratory passages. See *Chemical Warfare*.

Blith, Walter. English 17th century agriculturist. His memory is preserved only by his book on agriculture, *The English Improver, or A New Survey of Husbandry*. It appeared in 1649, and in a revised edition dedicated to Cromwell in 1652 Blith points out that the raising of the rent by the landlord when a tenant made improvements was prejudicial to agricultural improvement.

Blithe Spirit. Farceical comedy in 3 acts by Noel Coward. Produced July 2, 1941, at the Piccadilly Theatre, London, this play ran until March 9, 1946, at a number of leading playhouses, breaking, with 1,997 consecutive performances, the record for a non-musical play, and indeed all records except for *Chu Chin Chow* (*q.v.*). Cecil Parker, Fay Compton, Margaret Rutherford, and Kay Hammond played in the original production. *Blithe Spirit* appeared as a film in 1945.

Blitong. Variant spelling of the name of the Indonesian island better known as Billiton (*q.v.*).

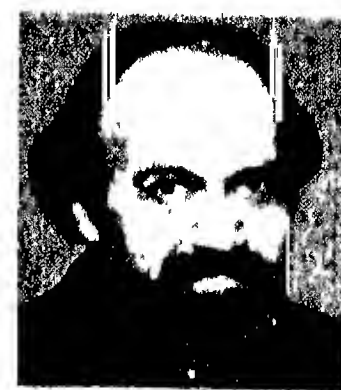
Blitzkrieg (German *Blitz*, flash (of lightning); *Krieg*, war). In the military sense, and as exemplified by the Nazi theory and practice of war, the rapid destruction of an enemy army or country by one or several annihilating blows. A successful blitzkrieg entails the closest cooperation between armour, mobile artillery, motorised infantry, and bombing aircraft. The essence of the blitzkrieg is speed, the Panzer (*q.v.*) divisions exploiting gaps in the defence softened by high-level and dive-bombing; any pockets of resistance surviving the Panzer thrust are mopped up by the following motorised infantry. Simultaneously with the armoured break-through, bombing aircraft disrupt the enemy's lines of communication and relentlessly bomb his cities and war-production plant.

The point to be chosen for a blitzkrieg attack must be one where it will be possible to gain a quick decision, and also one where the system of roads will facilitate the simultaneous advance of the motorised infantry and artillery grouped in the rear. Also, there must be a number of alternative points at which a break-through can be made, so that if the initial thrust is held or meets strong opposition, the attack can rapidly be transferred to another point. The whole aim of a blitzkrieg is to pierce the enemy's defences, outflank his secondary defence system, and separate his armies into isolated groups.

The blitzkrieg doctrine was successfully applied by Germany in Poland, Sept., 1939; Norway, April, 1940; the Netherlands and France, May-June, 1940; Yugoslavia, April, 1941. Throughout the Second Great War the word "blitz" was used in Great Britain as a vulgarism for a German air raid or series of air raids.

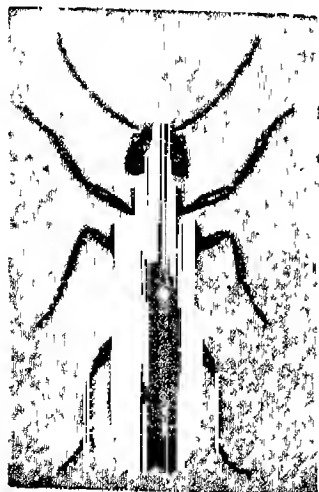
Blizzard. Violent and bitterly cold wind accompanied by blinding snow. It is really a cold wave at a high velocity and a low temperature and filled with snow. Blizzards are usually caused by the passage of a vigorous winter cyclone towards whose rear the pressure gradients are so steep that the air commonly reaches a velocity of from 40 m. to 60 m. per hour.

Bloch, Ernst (b. 1880). Swiss-born U.S. composer. Born at Geneva, July 24, 1880, of Jewish



Ernst Bloch,
American composer

parents, he had his first musical instruction from Jacques-Daleroze and studied in Brussels under Ysaÿe and Russe. In 1895 he wrote an *Oriental Symphony* and a number of songs and pieces for piano and for violin. In 1902 he settled in Paris, and in 1915 was appointed professor at the Geneva Conservatoire. The following year he toured America with Maud Allan, and settled there. His orchestral works include *Schelomo*, and *Israel* (both with voices), and *Trois Poèmes Juifs*; his chamber music, a concerto grosso and piano quintet. His orchestration is full of combinations of vivid colour and originality, but his later experiments in quarter-tones are not easy to follow.



Blister Beetle, *Lytta vesicatoria*

Bloch, MARC (1886-1944). A French historian and Resistance martyr. He was born at Lyons on July 6, 1886, child of an Alsatian Jewish family. He passed to the École Normale Supérieure, and after the usual apprenticeship teaching in lycées, he became in 1919 professor of medieval history at Strasbourg, in 1937 professor of economic history at the Sorbonne. He served in both Great Wars, and in the Second, after escaping from Dunkirk to England, returned to France, refusing to leave it although in special danger because of his Jewish origins. He joined the Resistance and became an important leader in the Lyons region. He was captured early in 1944, tortured, and finally shot on June 16, 1944, devoting his last moments to comforting a boy who was in the same group of victims. He had some prevision of his probable fate and, although proud of his Jewish ancestry, specifically forbade in his will any religious rites in his memory. His life and death were commemorated in a solemn celebration in the Sorbonne after the end of the war.

Bloch was one of the most remarkable French historians of his generation. He first attracted attention by his thesis on the *rois thaumaturges*, the medieval kings of France and England who touched for the king's evil and performed other religious and semi-magical rites. He revolutionised the study of French medieval economic history and, with Lucien Febvre, founded the invaluable *Annales d'Histoire Économique*. He also lectured on American economic history. Of two posthumous works, *L'Étrange Défaite* (Eng. trans. *The Strange Defeat*, 1949) and *Apologie pour l'Histoire* (Eng. trans. *The Historian's Craft*, 1954), the first is an important document for the causes of the French defeat in 1940.

Block. Word commonly meaning a large piece of wood, used also in several technical connotations. Thus, a pulley block consists of one or more pulleys as sheaves mounted in a frame fitted with a hook or eye by which the block or load can be suspended or secured. (See *Blocks and Tackle*.)

In printing, a block is the engraved plate used in the illustration of books, periodicals, and other letterpress.

The term block is also used to denote a mass of the earth's crust enclosed by some marked geological or topographical feature. Faults, or lines of fracture, often

form the boundary lines of such blocks which, when they are upraised or tilted to form mountain chains, are referred to as block-mountains, *e.g.* those in the Great Basin of western U.S.A.

Block. Island in the Atlantic. It lies 10 m. S. of the mainland of Rhode Island, U.S.A., and forms part of Newport co. It is co-extensive with the summer resort of New Shoreham—pop. (1950) 752—and is 7 m. long and $1\frac{1}{2}$ – $3\frac{1}{2}$ m. broad; it contains more than 300 ponds. Visited in 1614 by Adrian Block, who named it, it was settled in 1661, and in 1689 was captured by French privateers.

Blockade. The act of a belligerent by which, with his warships, he prevents shipping, whether enemy or neutral, from entering or leaving all or some of the ports or of the coastline of the enemy. If a ship attempts to break the blockade, both ship and cargo may be condemned—*i.e.* seized by the belligerent. A blockade may be either strategic (*i.e.* in connexion with some military operation against the enemy on land, *e.g.* a siege)—or, as is now generally accepted, commercial (*i.e.* without any military operations and designed merely to prevent the enemy from exporting or importing any supplies or goods).

Blockade dates only from the time when the rights of neutrals first began to be recognized, and the earliest blockade appears to have been that instituted in 1584 by the Dutch against their own ports then occupied by the Spaniards. Before that the right of any state to remain neutral was almost unknown, every state being expected to take sides either for or against a belligerent, and the rules gradually introduced relating to the law of blockade were in reality a recognition of the status of neutrality and a protection to neutrals against indiscriminate seizure of their ships and goods.

The rules of blockade have developed from the struggle between belligerents desirous of making full use of their sea power and neutrals desirous of preserving their commerce or even of increasing it because of the war; but as these rules have never been laid down in any internationally accepted code, they depend to a large extent on the practice of nations and there is much uncertainty. The Declaration of Paris, 1856, contained one somewhat vague reference to blockade, and although the Declaration of London, 1909, provided a complete

code, it was never ratified by Great Britain and so never became binding.

A problem that was never fully solved was what constituted a blockade. Was it sufficient for a belligerent to declare a blockade of a port without taking steps to make it effective (a "paper" blockade), such ships as were encountered being seized, but the vast majority passing through unmolested? If a mere declaration was not effective, what additional steps must be taken? "Paper" blockades were frequent in the 17th and 18th centuries, being much used both by France and Great Britain into the 19th century. As commerce increased, so did the inconvenience and loss to neutrals. During the War of American Independence between Great Britain and her American colonies, treaties were made, 1780–83, between various neutrals including Russia, Denmark, and Sweden—the First Armed Neutrality—agreeing to maintain by force certain principles of neutrality, including the rule that a blockade should be recognized only if maintained by a chain of anchored warships stationed near together. This doctrine benefited the neutrals because obviously, the more warships necessary to establish a blockade, the smaller would be the coastline that a belligerent would be able to blockade, and the larger therefore would be the coastline open to neutral trade.

This view was never accepted by Great Britain nor, indeed, generally at that time; but by the middle of the 19th century it was recognized that "paper" blockades were not true blockades, and that some degree of effectiveness was necessary. This view was set out in the Declaration of Paris, 1856, which required that a blockade must be maintained by such a force as was sufficient really to prevent access to the coast. There was much doubt as to the exact meaning of this rule, it being contended by some (*e.g.* by France up to 1914) that it coincided with the demands of the Armed Neutrality, and by others (*e.g.* Great Britain and the U.S.A.) that cruising men of war were sufficient so long as it was "most probable" that a ship attempting to break the blockade would be detected. The Declaration of London, 1909, which drew up a code for the laws of blockade (never ratified by Great Britain), while confirming the rule of the Declaration of Paris, laid it down that it was a question

of fact whether or not a blockade was effective.

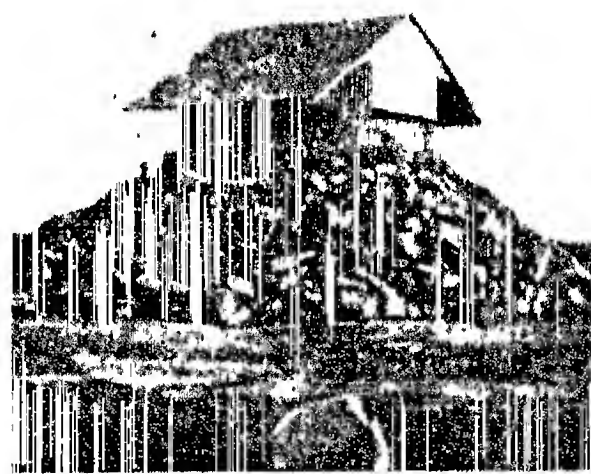
Thus many points still remained in dispute. It was accepted that a ship must be aware of the blockade before she could be condemned, but some states required a ship to be stopped and warned while others were satisfied if it could be presumed that the ship must have become aware of the blockade either from notoriety or through notification to the state to which the ship belonged. It was further generally accepted that a ship going to a neutral port could not be condemned even though it could be proved that its cargo was intended to be re-shipped into the blockaded territory. The U.S.A. had taken a different view, acquiesced in by Great Britain during the American Civil War when the Northern states blockaded the Southern coastline, and British ships bound for Nassau with cargoes intended for the Southern states were condemned by the Northern states. Again, in a later time it was agreed that a blockade must be maintained by warships although aeroplanes might assist; but whether a blockade could be maintained by submarines and to what extent mines might be used was in doubt.

In both Great Wars, while to deprive the enemy of supplies and of trade became of enormously increased importance, yet the development of the submarine and the aeroplane and the use of mines made it impossible in practice for any blockade to conform to the rules—which had up to that time been more or less generally accepted. Thus, in these wars, there were no true blockades in the major theatres of war, and the so-called long-distance blockades by Great Britain were instituted. In the First Great War, although not bound by them, Great Britain at first adopted the rules of the unratified Declaration of London but very soon abandoned them. Indeed, observance of the declaration which provided that the blockading forces must not bar access to neutral ports or coasts, and that a ship could not be captured for breach of blockade while on her way to a non-blockaded port whatever might be her ultimate destination, would have rendered impossible the "blockade" that was in fact imposed by Great Britain on the coastline of Europe from Scandinavia to the Netherlands.

Although this action by Great Britain was generally and officially described as a blockade, it was in

fact legally imposed not as a blockade but in accordance with the doctrine of reprisal or retaliation—a somewhat dangerous doctrine which entitles one belligerent to commit acts otherwise illegal if the other belligerent has committed illegal acts. Thus the order in council of March 11, 1915, which ordered the fleet to prevent all exports from or imports to Germany, was made in retaliation for Germany's proclamation in Feb., 1915, that all waters round the British Isles were a war zone—a process which itself illustrates the danger of the doctrine of reprisal, for that proclamation (which led to the loss of the *Lusitania*) had been made by Germany as a reprisal against the failure of Great Britain to observe the Declaration of London.

The later British order of Feb. 16, 1917, which decreed that any vessel with goods of enemy origin



that there was any technical blockade.

The situation as to the law of blockade would thus seem to be unsatisfactory. In the conditions of modern warfare, states consider it essential to prevent supplies of almost all commodities from reaching the enemy. This object is the same as that of blockade. Conditions of modern war made it impossible to impose a blockade which conforms to the accepted rules, and, further, the belligerent desires to restrict access not only to enemy ports but also to those of adjoining neutrals—a right never included in a blockade. As a result belligerents are driven to rely on the unsatisfactory doctrine of reprisals to justify them in taking the steps they consider essential.

Blockhouse. Fortified building or small fort provided with gun slits to give a wide arc of fire. Log



Blockhouse. Left, wooden type used in the South African War 1899-1902. Right, concrete blockhouse, a type constructed during the Second Great War, 1939-45

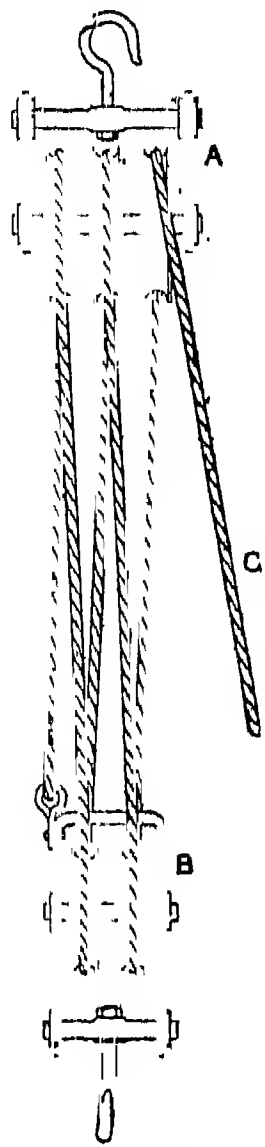
or with an enemy destination might be condemned unless she had called for examination at a British or Allied port, was in retaliation for the famous German declaration of unlimited submarine warfare made on Feb. 1, 1917. The U.S.A. protested vigorously against the British measures on the grounds *inter alia* that they amounted to a blockade of neutral ports.

Ultimately the desired objects were achieved with the aid of the extension of the law of contraband and the introduction of the navicert system under which certificates were granted to neutrals when it could be shown that the cargoes had a genuine neutral destination. Cargoes not so certified were seized, the situation naturally becoming very much easier when the chief neutral, the U.S.A. itself, became a belligerent.

In the Second Great War orders in council imposed similar restrictions, the orders being made in retaliation for illegal minelaying and submarine war by the Germans. It was not suggested

blockhouses were built by the early settlers in N. America as protection against attacks by Indians. Wooden blockhouses covered with corrugated iron were extensively used in the South African War, 1899-1902. Concrete blockhouses and "pill boxes" were introduced in the First Great War and provided the strongest defence sectors of the famous Hindenburg line. During the Second Great War various types of reinforced concrete blockhouse were developed by both sides. Many of the larger types housed heavy artillery and were themselves able to withstand all but a direct hit. The technique of defence in depth demanded large numbers of blockhouses spaced at irregular depths. As part of Great Britain's defences against the German invasion threat of 1940-41, concrete blockhouses were built at vulnerable points in all large cities, and sited throughout the British Isles at road junctions, bridges, and railway cuttings. Most of them had exterior fire trenches, wire entanglements, and tank obstacles.

Blocks and Tackle. Device in which the principle of the pulley is applied to secure greater leverage or purchase in lifting or hauling loads. The blocks comprise two wood or iron frames, Fig. 1, A and B, in which parallel pulleys, revolving independently on a common shaft, are fitted. The frame A contains one more pulley than B, and is suspended from or secured to a fixed object by a hook or ring. A rope or chain C is passed over one of the pulleys of A, down and round a pulley in B, up and round another pulley of A, and so on, according to the number of sheaves (pulleys), and finally, after passing round the last pulley of A, is secured to the top of the block B. The hook of B is then secured to the object to be lifted or hauled, and by pulling on the free end C the required movement is effected. The greater the number of pulleys the greater the leverage.



Blocks and tackle; fig. 1

A snatch block is one around which the hoisting rope of a crane is taken. It may have a single sheave, or several, the object being to gain mechanical advantage, as explained above. A pulley block used to change direction of a hauling rope is also called a snatch block.

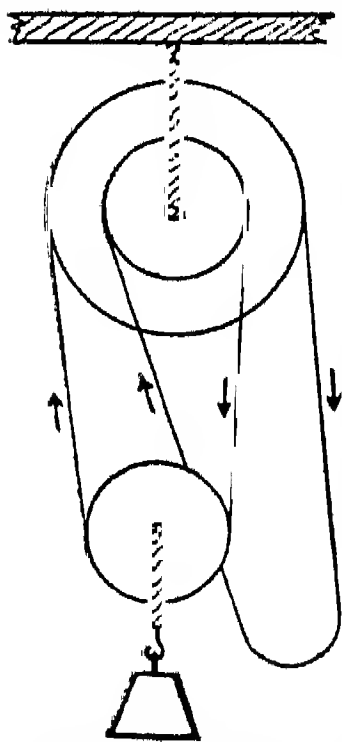


Fig. 2. Differential pulley block; arrows show direction of pull. The differential block has a two-sheaved pulley above and the usual single block at the opposite end of the chain. The top pulley is cast from a single

piece of iron or steel, and is recessed with sockets which each take a link of the chain. One sheave is larger in diameter than the other, and has one chain-socket more. The chain is an endless one, rove through the blocks in the manner shown in Fig. 2. In geared blocks only one sheave is provided in each block, the sheave in the fixed block being geared up by toothed wheels to a chain wheel over which an endless chain passes; the mechanical advantage being increased by the gearing. See Pulley.

Blocksberg. Variant spelling of a summit of the Harz Mts., Germany, the Brocken (*q.v.*).

Blockship. Vessel filled with concrete and sunk in time of war to close a port or shipping channel. In the First and Second Great Wars blockships were sunk at British naval harbours to close them to U-boats, leaving only a narrow channel for the movement of warships. On April 23, 1918, two obsolete British cruisers were sunk at the mouth of the Bruges canal, Zeebrugge, rendering the waterway useless to the enemy. On March 28, 1942, H.M.S. Campbeltown, a 1,200-ton destroyer, was sunk to block the main lock-gate at St. Nazaire. When the Allies landed in Normandy on June 6, 1944, sixty ships of various types and sizes, including a number of obsolete warships, were sunk off the beaches to provide immediate shelter for the hosts of small craft landing troops and stores. The breakwater of blockships served as an outer protection for the prefabricated harbour Mulberry (*q.v.*).

Block System. A method of dividing up a rly. into sections or blocks, for operating traffic. Each block is protected at the entrance end by signals which warn a train against entering it while another train is in it.



Bloemfontein. President Brand Street and Provincial House of Assembly: a striking view of this well-laid-out South African city

Block Tin. Inferior grade of tin, so called from being made in the form of blocks. After the pure or grain tin has fused and been run off, the remainder, after being subjected to still greater heat, is run into moulds and becomes block tin. See Tin.

Bloemaert, ABRAHAM (c. 1564-1651). Dutch painter. Son of the sculptor Cornelis Bloemaert, he was born at Gorkum, and studied painting with Gerrit Splinter at Utrecht and Joost de Beer at Antwerp. Bloemaert was a prolific and versatile painter of history, genre, and portraits; he was the master of many of the Dutch artists. He died Jan 27, 1651.

Bloemfontein. Capital of the Orange Free State. Situated on the Modder river, 4,568 ft. above sea level, and 450 m. by rly. N. of Port Elizabeth and 750 m. by rly. N.E. of Cape Town, it was founded in 1846, and occupied by Lord Roberts on March 13, 1900.

When the Union of South Africa was effected in 1910, Bloemfontein was chosen as the seat of the supreme court. It is now the busy commercial hub of the O.F.S. Seat of an Anglican bishop, it has as chief buildings the cathedral, a handsome Dutch Reformed church, a synagogue, the national museum, the administrative buildings, the Orange Free State University, a public library, and a theatre. It is a finely planned residential town, and its congenial climate attracts many invalids, and has made it a favourite centre for religious, political, educational, and other conferences. The mean temp. is 73° F. Jan., 47° F. June July; annual rainfall 21 ins. Pop. (1951) 109,369, of whom 49,074 were white.



Bloemfontein arms

Blois. Town of France, capital of the department of Loir-et-Cher. On the Loire, some 35 m. S.W. of Orléans, it is the seat of a bishopric. It makes earthenware, tapestries, furniture, shoes, and chocolate. It was badly damaged in June, 1940. Pop. (1954) 28,190. Its famous castle, built in the 13th century, came into the possession of the Orléans family in the 15th. Charles d'Orléans (1391-1465), the poet, changed the stronghold into a more cheerful dwelling. His son Louis XII was born there. Francis I built the beautiful Renaissance part of the castle. It was the scene of the murder of Henri, duke of Guise, in 1588. Joined to the crown in 1660, it fell into decay; it was restored during 1849-70.

Blok, ALEXANDER ALEXANDROVICH (1880-1921). Russian poet. He was reared in the society of intellectuals, his grandfather being rector of the university of St. Petersburg, where Blok himself studied first law and then philology, 1898-1906. His first published volume was *Verses about the Beautiful Lady*, 1904. Blok was acclaimed by the Symbolists. He took to drink, this period of disillusionment being expressed in his *Nocturnal Hours*, 1911; but war stirred him to patriotic fervour, and by 1918 he was the most famous poet of the time. Altogether he produced ten volumes, his masterpiece being *The Twelve*, 1918, a dramatic poem in which twelve Red army men are visited by the figure of Christ. Blok was a supporter of the revolution of 1917, though his enthusiasm waned before his death in 1921.

Blomberg, WERNER, BARON VON (1878-1946). German soldier. Born at Stargard, Pomerania, Sept. 2, 1878, he rose to colonel in the First Great War and, remaining in the republican Reichswehr, became a divisional and later the military commander of E. Prussia. In 1930 he went on a mission to study the U.S. army organization. A Nazi sympathiser before the appointment of Hitler as chancellor, he prevented a revolt of the Potsdam garrison on this appointment. Chosen as war minister by Hitler, he was dismissed in 1938. He died from heart failure in a U.S. military hospital at Nuremberg, March 13, 1946.

Blomfield, SIR ARTHUR WILLIAM (1829-99). British architect. He was fourth son of Bishop Blomfield, and was born March 6, 1829, and educated at Rugby and Trinity College, Cambridge. Articled as an architect to P. C.

Hardwick, he set up his own office in 1856, and as the designer and restorer of churches and a specialist in modern Gothic, soon enjoyed a large practice. He became a fellow of the R.I.B.A., 1867, and was knighted in 1897. His work included the churches of S. Barnabas, Oxford, S. Mary, Portsea, and S. George, Cannes, and the restoration and rebuilding of S. Saviour's, Southwark. He died Oct. 30, 1899.

Blomfield, CHARLES JAMES (1786-1857). A British prelate. Born at Bury St. Edmunds, May



Charles J. Blomfield,
British divine
From a contemp. drawing by J. Templeton

29, 1786, he was educated at Trinity College, Cambridge. Successively rector of S. Botolph's, Bishopsgate, archdeacon of Colchester, bishop of Chester, he was bishop of London from 1828 until shortly before his death at Fulham Palace, Aug. 5, 1857. An able administrator, taking a moderate view of the Tractarian controversy, he created a diocesan fund for church building which resulted in the addition of 200 new churches in London. He edited five plays of Aeschylus.

Blomfield, SIR REGINALD THEODORE (1856-1942). British architect. Born Dec. 20, 1856, he was a grandson of Bishop Blomfield and was educated at Haileybury and Exeter College, Oxford. He studied architecture at the R.A., and began to practise a few



Sir R. T. Blomfield,
British architect
Russell

years later, specialising in civil architecture and also in garden design. Elected A.R.A. 1905 and R.A. 1914, he was president of the R.I.B.A. during 1912-14, and was knighted in 1919. He died Dec. 27, 1942. Among his works were designs for the Menin Gate, the Regent St. Quadrant, United University Club, the Carlton Club, Sherborne school buildings, Lady Margaret Hall, Oxford, and many country houses. He was the author of *The Formal Garden in England*, 1892; *History of Renaissance Architecture in England*, 1897; *The Mistress Art*, 1908; *History of French Architecture from Charles*

VIII to the Death of Mazarin, 1911; and his memoirs, 1932.

Blommers, BERNARDUS JOHANNES (1845-1914). Dutch painter. Born at The Hague, Jan. 30, 1845, he first studied lithography with his father, but later decided to take up painting. In 1869 he became the pupil of Joseph Israels. Blommers painted landscapes and seascapes and the genre of the middle and lower class industrial life with equal facility, and won high honour in Holland and at Paris and Antwerp. His chief works are *Le Petit Moulin*; *Bonjour, Père*; *Le Repas des Pêcheurs*; and *Joie Maternelle*. He died Dec. 15, 1914.

Blondel. French 12th century minstrel. Born at Nesle, Picardy, he accompanied Richard I to Palestine in 1190. He is said to have discovered Richard's place of detention by singing outside the walls of the castle of Dürrenstein, Austria, a love song which they had composed together. The romantic story that makes Blondel the king's deliverer from prison rests solely on the French Chronicle of Reims (13th century). The poems which have come down to us under Blondel's name, published by Prosper Tarbé at Reims in 1862, are of little merit.

Blondin, CHARLES (1824-97). French tight-rope walker. Born at St. Omer, France, Feb. 24, 1824, his real name was Jean François Gravelet. An acrobat at the age of five, he gained notoriety and a fortune in 1859 by crossing Niagara Falls on a tight-rope. This feat he accomplished several times, performing many daring tricks while crossing the rope. Blondin afterwards settled in England, and gave exhibitions in London at the Crystal Palace and in other parts of the United Kingdom, first in 1861 and again in 1862 and onwards. He died Feb. 19, 1897.

Blondin, PIERRE EDOUARD (1874-1943). Canadian politician. Born at St. François du Lac, Yamaska, Dec. 14, 1874, educated at Laval university, Montreal, he became a lawyer. In 1908 he was returned to the house of commons for Champlain, and in 1911 was deputy speaker. As a Conservative in 1914 he entered the Borden cabinet as minister of inland revenue. As P.M.G., he was a member of the coalition of 1917. Loyal to Borden during the troubles with the French Canadians over conscription, in 1918 he was chosen a senator, and was speaker of the senate 1930-35. He died Oct. 29, 1943.

Blood. Fluid present in the bodies of many living creatures. It consists of an almost clear fluid, the plasma, in which are suspended red cells (erythrocytes), white cells (leucocytes), and platelets. Its main function is the transport of all kinds of substances to and from the tissues and organs of the body—substances varying from oxygen, food material, and waste-products to hormones and antibodies. It is contained in special vessels, the arteries and veins, and is kept in constant circulation by the heart. Blood occurs not only in man, mammals, birds, and all other vertebrate animals, but also in many lower forms such as the worms, snails, and insects—though in lower forms it may differ in composition. The colour of mammalian blood depends on the amount of oxygen carried by the red cells; it is scarlet when rich in oxygen (arterial blood) and purplish when deficient (venous blood). In healthy human adults the blood represents about 8 p.c. of the total weight of the body, and 1 cu. mm. of a typical blood sample contains about 5,000,000 red cells, 8,000 white cells, and from 300,000 to 400,000 platelets.

Action of Plasma

Plasma may be obtained by centrifuging blood which has been prevented from clotting. It is a straw-coloured fluid containing many salts in solution, including sodium bicarbonate, which keeps the blood in a faintly alkaline state and also acts as a temporary store for the carbon dioxide given off by the tissues. It gives off much of its carbon dioxide in the lungs, whence the carbon dioxide is expelled from the body in the breath.

Plasma also contains a high proportion of proteins. These are manufactured chiefly by the liver, and include fibrinogen, which is important in the clotting of blood; the globulins, proteins of high molecular weight which include the antibodies formed in response to bacterial and other infections as the body's main line of defence against disease; and the albumins, proteins of low molecular weight which play an important rôle in the distribution of water in the body, and prevent waterlogging of the tissues.

Mammalian red cells are usually almost circular flattened disks which have a diameter of about 7 microns (*i.e.* about $1/3700$ inch), and contain no nuclei once they are released into the blood-stream. The red cells produced by mamma-

lian embryos, however, are nucleated; also those of adult birds and reptiles. The red cells are continuously being destroyed in the liver (their life span is *c.* 120 days); but the number circulating in the blood remains constant.

Red cells contain the respiratory pigment haemoglobin, a protein which readily combines with oxygen to form the substance oxyhaemoglobin. This is easily split up again, so that oxygen is made available whenever oxyhaemoglobin reaches a tissue which is short of oxygen. The haemoglobin released during red-cell destruction in the liver and spleen is broken down and excreted by the kidneys, but the iron it contains is retained and utilised, in the formation of new red cells, by the bone marrow. Persons suffering from certain forms of anaemia (*i.e.* a serious shortage of haemoglobin) can often be cured by eating foods or substances with a high iron content.

Work of White Cells

White cells are produced by the spleen, bone-marrow, and lymph nodes. They are nucleated, and several types can be recognized by the shape and size of their nuclei. The polymorphonuclear white cells (70 p.c.) with large, lobed nuclei, and the monocytes (5 p.c.) with horse-shoe shaped nuclei, are both from 10 to 12 microns in diameter and can move actively in the manner of an amoeba, *i.e.* with the help of protoplasmic processes. Their main function is to engulf and digest foreign organisms (a process called phagocytosis), and, together with the antibodies, they control bacterial, viral, or parasitic invasion of the body. White cells congregate wherever a local infection occurs, the resulting pus consisting chiefly of dead white cells.

The lymphocytes (20 p.c.) have prominent and rounded nuclei, and are only slightly larger than red cells. They are produced by the tissues of the lymph nodes and appear in large numbers during the course of infections of a chronic type, *e.g.* tuberculosis. The exact rôle played by them in the defence of the body is not clear; but it is almost certain that they are in some way associated with the action of antibodies. The only other important white cells are eosinophile leucocytes, so called because they contain numerous granules in the cytoplasm which receive blood, and the two muscular ventricles which pump it readily take up the stain eosin.

Their precise function is the subject of debate.

The blood platelets are minute particles of cytoplasm, about 2 microns in diameter, which are believed to be produced by the extrusion of fragments from cells in the bone marrow. They have no organized nuclei. They are concerned with the clotting of blood. Injury to the tissues almost invariably results in the rupture of blood vessels and consequent bleeding. Since there is a limit to the amount of blood which can be lost without danger, it is of paramount importance that there should be a device to stop such blood loss: the clotting of blood provides such a mechanism. When blood leaves the circulation the plasma sets into a firm jelly which gradually hardens into a crust, and this acts as an effective seal to prevent the exudation of more blood. The chemical changes causing clot formation are complex and incompletely understood, but the sequence of events is roughly as follows: platelets rapidly accumulate in freshly shed blood, stick together in clumps, and proceed to disintegrate. This releases from them an enzyme (thrombokinase) which reacts with another enzyme present in the plasma to form thrombin. Thrombin combines with the fibrinogen of the plasma to form the fibrin threads which are responsible for the fine mesh of the clot.

Blood can be prevented from clotting by the addition of certain substances called anticoagulants, of which sodium citrate and heparin are examples. The blood of some human beings either does not clot, or does so only very reluctantly. This may be due to the condition called haemophilia. The platelets of haemophilic persons do not yield the enzyme required for normal clotting. Clotting can be induced by the application of certain snake venoms containing the missing enzymes.

Circulation of the Blood

The circulation of the blood was first described by William Harvey in 1616. The organ responsible for maintaining the flow of blood against the considerable resistance of the vessels is the heart. In the higher animals such as the reptiles, birds, and mammals, the heart is divided into four chambers: the two thin-walled auricles which receive the blood, and the two muscular ventricles which pump it into the main arteries and so to

the various parts of the body. The auricles and ventricles of each side are connected by an opening guarded by valves which are so arranged that blood can flow only from auricle to ventricle. There is no direct connexion between the ventricles or between the auricles.

The left ventricle pumps the blood into the arterial system, and this carries it to the various organs and tissues of the body. This blood is well oxygenated since it has only just been returned from the lungs, in which carbon dioxide has been released from the plasma and oxygen taken up by the haemoglobin. Because the arteries have to withstand the pressure set up by the rhythmical pumping action of the left ventricle their walls are more muscular, and therefore more elastic, than those of the veins. In the organs and tissues the large arteries are divided up into smaller and smaller vessels, and these in turn break up into a complex network of fine capillaries. These have a diameter of about 10 microns, are extremely thin-walled, and are well suited for the diffusion into the tissues of the many different substances carried by the blood. The supply of these substances depends upon a diffusion gradient: the movement of oxygen, for example, takes place from the point of high concentration (blood capillary) in the direction of lower concentration (*e.g.* muscle fibre). A similar mechanism, this time in the opposite direction, accounts for the withdrawal from the tissues of carbon dioxide and other waste products.

The capillaries drain into small veins which unite to form the large veins, and return the now de-oxygenated blood to the right auricle. The blood coming from the lower limbs makes a vital detour through the kidneys in order to rid itself of waste products such as urea and salts. Similarly, the blood returning from the intestine passes through the capillary system of the liver in which any surplus sugars are removed and stored in the form of animal starch (glycogen).

The right auricle sends the blood into the right ventricle from which it is pumped into an artery leading to the lungs. Here, as in the kidney and liver, another capillary system is formed in order to provide a large surface area for the discharge of carbon dioxide and the taking in of oxygen. A vein returns the oxygenated blood to the left auricle and the whole cycle, which in man takes from 20 to 25

seconds is immediately repeated. The well-known double heart beat is caused by the contraction, in quick succession, of the auricles and ventricles (systole), followed by a short period of muscular relaxation (diastole). The heart of a normal resting adult beats about 70 times a minute. Each contraction sets up a wave of high pressure in the arteries which constitutes the pulse. The average pressure on the larger arteries is about 120 millimetres of mercury, that of the large veins being as low as 1 mm. For clinical purposes, blood pressure is measured with a sphygmomanometer. The blood pressure in human beings usually increases with age, and abnormally high pressure (hypertension) may be caused by certain complaints of the kidneys.

The Lymphatic System

In the tissues there occurs an extensive leakage of plasma from the capillaries into the tissue spaces. Individual cells are thus brought into intimate contact with the plasma. Unless the plasma is quickly removed, the accumulation of fluid would result in serious waterlogging of the tissues. A widespread system of channels, the lymphatics, absorbs and removes fluid. The lymphatic system is almost as comprehensive in its distribution as the venous system, the smaller vessels joining to form the large lymphatics which eventually discharge their contents, the lymph, into the major veins at the base of the neck.

Along the course of the lymphatics are groups of bulbous swellings, the lymph nodes. In man these are particularly numerous in the groins, arm-pits, viscera, and neck, and they contain valves which ensure the passage of the lymph in one direction only. The main function of the nodes is to filter the lymph and to retain foreign matter or cellular debris, which is ingested and destroyed by the phagocytic cells lining their passages. The lymph nodes also produce lymphocytes and antibodies, and therefore play a vital rôle in the body's defence against disease.

BLOOD GROUPS. K. Landsteiner discovered in 1901 that human blood can be classified into four main groups depending on the presence or absence in the red cells of two antigens which he called A and B. These antigens may be present singly (group A or B) or together (group AB); while in many individuals both are absent

(group O). The blood of individuals of the same group can be mixed without causing the clumping of the red cells (agglutination) which it is so important to avoid in blood transfusions.

But when two blood samples of incompatible groups are mixed, clumping of the red cells will occur. The clumping is due to a chemical reaction between the antigens of the red cells and antibodies present in the plasma. A person with A red cells will automatically carry antibodies directed against B red cells: B blood is incompatible with his own. Similarly, A blood is incompatible with that of a B person. Cross transfusions would have very deleterious consequences. Individuals with group AB are sometimes called universal recipients because, since they carry no antibody against A or B antigens, they can receive blood from any individual, no matter to which of the main groups he may belong. On the other hand, persons with group O blood carry antibodies against both A and B antigens; they can be transfused with blood from members of their own group only.

These four blood groups are inherited according to Mendelian laws and, provided the group of both parents can be ascertained, it is frequently possible to forecast the groups of their children—a method which has sometimes proved helpful in instances of disputed parentage or accidentally interchanged infants (*see* Blood Test below).

Distribution of Blood Groups

The proportion of people belonging to a given blood group varies in different parts of the world. In England, for example, about 44 p.c. of the population belong to group A, 8 p.c. to group B, 3 p.c. to group AB, 45 p.c. to group O. In central Asia, on the other hand, group B is very much more numerous; while amongst the aboriginal population of Australia it is completely absent. The distribution of blood group antigens is used by scientists studying the origins and evolution of the human race (*see* Anthropology and Blood Groups below). It is also of considerable evolutionary interest that some of the red cell antigens are known to occur in certain animals, notably in the apes and higher monkeys.

New blood groups are constantly being identified in man, the A and B antigens themselves having yielded several sub-groups. For-

fortunately not all of them are significant from a medical point of view; but one other group deserves special mention in view of the rôle it plays in causing haemolytic disease of the newborn—a condition of severe anaemia which may cause death. This is the rhesus (Rh) antigen which is carried by the red cells of about 85 p.c. of the population (Rh-positive individuals) but is absent in the remainder (Rh-negative individuals). An Rh negative woman with an Rh positive husband may sometimes carry an Rh positive foetus, the antigen being inherited in much the same way as the A and B antigens. Owing to accidental rupture of the placental capillaries, it may happen that some of the foetal red cells find their way into the maternal circulation. The mother, being Rh negative, will be immunised and produce Rh antibodies, and these will find their way across the placental barrier and so into the foetus. Here they will react with the Rh antigen of the foetal red cells and so cause the anaemia characteristic of haemolytic disease.

Fortunately the immunisation of the mother occurs very erratically and frequently it does not take place at all: the disease is known to occur in only one out of every 40 expected cases.

Blood Transfusion

Blood transfusions are given to patients suffering from acute anaemia, *i.e.* a severe shortage of red cells, which may be due to injury, surgery, child-birth, Rh incompatibility, or some other cause. The standard volume of blood removed from donors is rather less than 1 pint, the loss being rapidly made good by the blood-forming tissues of the healthy body. The freshly removed blood is immediately mixed with a solution of sodium citrate to prevent clotting, and it can then be stored in a low temperature "blood-bank" for up to three weeks. Blood plasma is also used for transfusion; it can be given to anyone, and can be stored with greater ease and for longer periods than whole blood.

Blood transfusions were administered as early as the 17th century, but often ended in disaster because nothing was then known about blood groups; indeed, surgeons frequently used the blood of lambs, calves, pigs, and dogs in attempts to save human lives. The rapid clotting of blood also presented a great problem, and to overcome it the veins of donor and recipient

were directly joined by a tube. It is no wonder that the whole concept of blood transfusion fell into disrepute; and it was not until the 20th century that transfusion became a safe medical aid.

ANTHROPOLOGY AND BLOOD GROUPS. During the First Great War, Dr. Hirsfeld discovered that the percentages of the A.B.O. blood groups varied in different peoples. In each of the increased number of blood group systems since recognized, there is similar variation in frequency of each group from people to people. Since an individual's blood group is determined by heredity and is unaffected by environmental influences during his development, peoples can by the use of blood-group frequencies be described in terms of their hereditary make-up; a more accurate indication of their affinities is thus provided than by other body features which are complicated by environment.

Africans south of the Sahara are distinguished from all other peoples by their high frequency of the Rh gene combination *eDe* (or *Ro*). Asiatic Mongoloid peoples are characterised by the highest frequencies of blood group B and an absence of Rh negatives. American Indians and Australian aborigines are similar in their lack of B and Rh negative groups. European peoples possess the highest frequency of Rh negatives, especially in the west and among the Basques. Each of the major varieties of man is distinguished by its own particular frequencies of the groups of each blood group system. Variations of frequency within the major varieties distinguish the component peoples: higher frequencies of B, for example, distinguish peoples of eastern from those of western Europe.

Blood Test. In law a blood test may be used in criminal cases—*e.g.* to prove that blood stains in the clothing of a suspect were not made by his blood, but could have been made by the blood of some murdered or injured person; or in affiliation cases; but here a blood test can assist only negatively in that it may show the blood group of a child to be such that the person claimed to be the father could not in fact be the father.

A blood test may also be used to assist in determining whether or not a person is under the influence of drink. The test indicates the percentage of alcohol in the person's blood, and is often used in association with a urine test. In certain countries, *e.g.* Sweden, it is

an offence for a person to drive a motor vehicle if the amount of alcohol in his blood exceeds a specified percentage; but too much reliance cannot be placed on a blood test as evidence of drunkenness because of the very varying effect of alcohol on different persons.

Blood, Sir BINDON (1842–1940). British soldier whose name appeared in the army list for 80 years. Born Nov. 7, 1842, he entered the Royal Engineers, 1860, and served in the Zulu War, 1879; the Afghan War, 1880; the Egyptian War, 1882; the Chitral expedition, 1896; and commanded in the Malakand campaign, 1897, in which (Sir) Winston Churchill acted as war correspondent. Churchill dedicated his first book, *The Story of the Malakand Field Force*, to Blood. In 1901 Blood commanded troops in the eastern Transvaal. He retired 1907, was knighted 1909, and in 1936, at the age of 94, was appointed chief royal engineer, a title which revived an old military dignity, that of chief engineer of the kingdom; this title he held until his death, May 16, 1940. He published an autobiography in 1933.

Blood, THOMAS (c. 1618–1680). Irish adventurer, better known as Colonel Blood, who stole the crown jewels from the Tower of London, May 9, 1671. He received a large assignment of land in Ireland as a reward for his zeal in the Parliamentary cause. Deprived of his estates in 1663, after the Restoration, he took part in an unsuccessful plot to surprise Dublin Castle and carry off Ormonde, the lord-lieutenant. He fled to the Dutch Republic and came under the protection of the duke of Buckingham. Captured after his impudent theft of the crown jewels, he insisted on seeing the king, Charles II, by whom he was pardoned. His forfeited Irish lands were subsequently restored to him. He died in London, Aug. 24, 1680.

Blood, COUNCIL OF. Name sometimes applied to the council of troubles, a tribunal set up in the Netherlands by Alva in 1567. Its object was to crush resistance to the Spanish domination and the Inquisition established by Philip II. Notable among its thousands of victims were the patriots Egmont and Horn, beheaded for high treason, June 5, 1568. It also declared William the Silent outlaw.

Blood Feud. Primitive institution imposing on a family or clan the duty of exacting vengeance for a homicide suffered at the hands of one of its members. The term is

also more generally used to describe the mutual hostility between the local communities to which the killer and avengers belong. It is to be distinguished from the state of war which results when homicide is committed outside the tribe, since in war there is no way of settling the dispute by arbitration whereas in feud the mechanism for such a settlement exists and is often elaborate. Thus the feud represents an important political and legal institution, guaranteeing an individual's life and property and limiting wasteful loss of life within the tribe. Some communities possess a special office, that of the avenger of blood.

The institution of feud is of widespread distribution and early occurrence. Established at least by Neolithic times, it was inherent in the social organization of the early Semites and the Aryan peoples. The codes of Hammurabi, Ethelbert (d. 616), and other law-makers sought to ameliorate its vindictiveness, and to stabilise the amount of the blood fine—the wergeld of early England. In various forms the institution survives among the Afghans, Albanians, Corsicans, S. Slavs, Africans, and others.

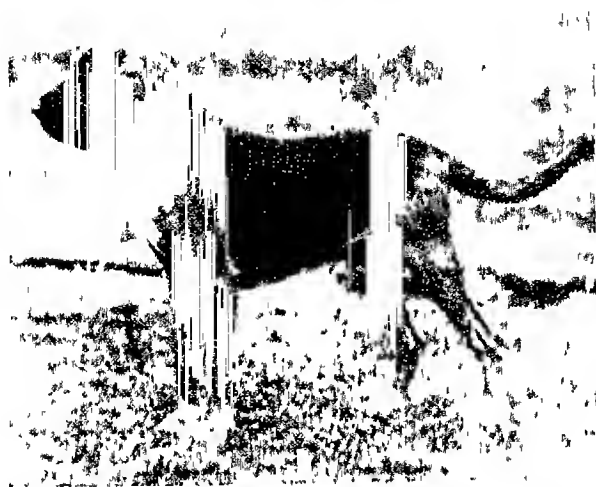
Blood Flower OR CAPE TULIP (*Haemanthus sanguineus*). A perennial bulbous plant of the large family Amaryllidaceae, a native of S. Africa. It has only two leaves, which are oblong-elliptic in shape. The fine scarlet flowers are gathered into dense umbels.

Bloodhound. One of the oldest breeds of British dogs, formerly called the sleuthhound. Famed since Roman times for its skill in hunting by scent, especially a wounded animal or man, it derives its name from the persistence with which it follows the scent of blood. Bloodhounds are still occasionally used in police work, and field trials in tracking are held, which encourage breeders to develop and maintain the remarkable scenting powers of this ancient breed.

The Cuban hound, a bloodhound used in the capture of runaway slaves, was a variety closely resembling a cross between bulldog and mastiff. It was renowned for its ferocity, whereas the true bloodhound is exceptionally docile.

The bloodhound is also valued for its ornamental qualities and its affectionate and intelligent disposition. Its high-peaked forehead, deep square muzzle, low-set ears hanging in long folds close to its face, and deep-set eyes give it a grave and aristocratic air. A good bloodhound should stand

about 24 ins. high at the shoulder, and should weigh about 90 lb. The forehead is very densely wrinkled, and the neck has a conspicuous dewlap. The coat should be very close, either black and tan or tawny, with no white showing.



Bloodhound. Basset of Barchester, dog of a famous strain

The hound should be well built and muscular, graceful in carriage, and with a sonorous voice.

Blood Money. Name given to the fine formerly paid either by a homicide to the relatives of his victim to secure himself against their vengeance, or as compensation for crimes of violence other than murder. In modern Arabia murder can still be expiated by paying blood money. The term also denotes money earned by bringing or successfully supporting a capital charge against a person, and in the U.S.A. has been used in printing works in a slang sense of the money demanded by compositors from better paid fellows. See Kinship.

Blood Poisoning. Popular term for the three morbid conditions, toxæmia, septicaemia, and pyaemia. Toxæmia is produced by absorption into the body of poisonous products formed by bacteria in a suppurating wound or abscess. This is the least serious form of blood poisoning, and usually, when the localised septic focus giving rise to the condition is drained and cleaned, the symptoms rapidly disappear. If, however, the cause is tetanus, botulism, or diphtheria, the toxic manifestations, in these cases neurological, persist after the bacterial focus has been cleared up. In botulism the toxin is absorbed from the intestine with food, whereas in diphtheria the toxin is absorbed from the local lesion, commonly the fauces (throat). Milder cases of puerperal fever are often instances of toxæmia, the toxins being generated by pus-producing organisms in the uterus.

Should bacteria appear transiently in the blood stream, the condition is termed bacteraemia.

This occurs frequently after a tooth extraction, and lasts a short time. If the organisms persist in the circulation, the condition is known as septicaemia, which is a serious condition. Most frequently it develops from a suppurating wound or abscess, but in some cases no local source of infection can be found. The symptoms usually begin with shivering fits, fever, and a rise of pulse rate. In acute cases death may occur within twenty-four hours, and in other cases after an interval of weeks or months. Recovery may be complete or permanent ill-health may result.

Pyaemia is a condition in which multiple abscesses form in various parts of the body owing to pus organisms entering the blood stream from some local source of infection. These abscesses may occur in the joints, skin, lungs, or liver. The onset is similar to that of septicaemia, but the temperature is higher, there may be rashes on the skin, and vomiting is often present. In acute cases death occurs early, but in chronic cases life may be prolonged for months, the abscesses recurring on different sites. Before the advent of the sulphonamide drugs and penicillin, septicaemia and pyaemia had a high mortality rate, but now it is unusual for a patient to die from either.

Blood Rain. Reddish coloured rain which sometimes falls in Italy and along the Mediterranean shores. The wind has great powers of transporting dust and sand particles, and a microscopic examination shows that this phenomenon is due to the formation of rain-drops on dust blown from the Sahara desert. On rare occasions this "red rain" is experienced in the British Isles. See Meteorology.

Blood Root (*Sanguinaria canadensis*). Perennial herb of the family Papaveraceae, native of North America. Its long, branched rootstock, which creeps underground, is filled with orange-red juice—hence the name. In spring two stalks a few inches long arise from each branch of this rootstock, one bearing a single rounded leaf, the other a large white flower.



Blood Root, *Sanguinaria canadensis*

Blood-stock. See Stud Farm.

Bloodstone OR HELIOTROPE. A dark green variety of chalcedony with red spots. Opaque and moderately hard, it takes a high polish, and, as it can be engraved, is much used for signet rings and seals.

Blood Test. See under Blood.

Bloody Sunday. Name given to Jan. 22 (O.S. Jan. 9), 1905, day on which Father Gapon led more than 200,000 working men, women, and children to the Winter Palace, St. Petersburg (Leningrad). Troops fired on the unarmed crowd; it was variously estimated that 150 to 500 were killed, 200 to 3,000 wounded.

Nov. 13, 1887, when the police tried to break up a meeting of the S.D.F. in Trafalgar Square, is also called Bloody Sunday. R. Cunningham Graham, M.P., and John Burns were arrested. There were over 100 casualties; two later died.

Bloom. Term in metallurgy. In early processes of producing iron, a lump of the metal was gradually formed by kneading a mass of ore in a semi-molten condition. This lump was then hammered into a block called a bloom. The term is currently used to describe the product of the first hot rolling operation on a cast ingot.

Bloomer, STEPHEN (1874-1938). English footballer, one of the best forwards of his day. Born at Cradley Heath, Staffs, he played for the Derby Swifts before joining the Derby County team. During 1895-1907 he played in 23 international matches, ten against Scotland. He died April 16, 1938.

Bloomer Costume. A form of feminine dress which consisted of a skirt long enough to reach just below the knees, worn over wide trousers gathered in at the ankle, and a fairly close fitting jacket. It was introduced in 1851 by Mrs. Amelia Jenks Bloomer, of New York, an advocate of women's rights, but was soon discarded.



Mrs. Bloomer in her original rational dress
From a daguerreotype

Bloomfield. A town of New Jersey, U.S.A., in Essex co. It stands on the Morris canal, immediately N. of Newark, and is

served by the Erie and Lackawanna rlys. The seat of the Newark German theological seminary, it has a memorial library, and manufactures paper, pins, brushes, silks, and woollens. It was named after Joseph Bloomfield, 1796. Pop. (1950) 49,307.

Bloomfield, ROBERT (1766-1823). British pastoral poet. Born of humble parentage at Honington, Suffolk, Dec. 3, 1766, at the age of 15 he came to London, where he eventually became a journeyman shoemaker. He lived in great poverty, but lost no opportunity of self-education, and began to write verse, one of his compositions, entitled *The Milkmaid*, appearing in *The London Magazine*. In 1800 he published *The Farmer's Boy*, of which 26,000 copies were sold within three years. Though Bloomfield won the praise of Byron in *English Bards and Scotch Reviewers*, posterity is inclined to endorse the verdict of Lamb, who regarded *The Farmer's Boy* as the product of a "poor mind." Bloomfield died at Shelford, Bedfordshire, Aug. 19, 1823.



Robert Bloomfield,
British poet
From a cont. engraving

Bloomington. City of Illinois, U.S.A., the co. seat of McLean co. It is 125 m. S.W. of Chicago, and is served by the Illinois Central and other rlys. It has machine-shops of the Chicago and Alton rly., and also coal-mining, vegetable-canning, and meat-packing industries. It is the seat of the Illinois Wesleyan university and of a Roman Catholic college, and has two hospitals, four sanatoria, and a library. Pop. (1950) 34,163.

Bloomsbury. London parish. It is bounded on the south by High Holborn; on the east by Southampton Row; on the N. by a line along the N. side of Russell Square extended to Gower Street; thence on the W. by a diagonal line to Broad Street. Bedford Square, though not in the parish, is usually regarded as part of Bloomsbury, a name often loosely used to include an area extending E. to Gray's Inn Road, N. to Euston Road. The original lord of the manor was William de Blemont, c. 1203, and the old name was Blemondsbury. Some streets and squares are named after titles of a later landlord, the duke of Bedford. Once a fashionable quarter, then known as the home

of intellectuals, Bloomsbury has now many hotels and flats.

In Great Russell Street is the British Museum (*q.v.*). The tower, 210 ft., of the London university buildings in Malet Street, is a landmark. St. George's, Bloomsbury Way, has an unusual steeple, surmounted by a figure of George I in a toga. In Bloomsbury Square, formerly Southampton Square, lived Baxter, Steele, the 4th Lord Chesterfield, Mansfield, Sir Hans Sloane, and Isaac D'Israeli.

Bloteling, ABRAHAM (c. 1634-98). Dutch engraver. Born at Amsterdam, he passed most of his working life in that city, though he is known to have spent two or three years in England. He produced a vast number of etchings, line engravings, and mezzotints after contemporary and older masters, some of which have suggested his association with the school of Cornelis and Pieter Visscher.

Blore Heath. Locality in Salop, England, 2 m. E.N.E. of Market Drayton. A battle here in the Wars of the Roses, Sept. 23, 1459, resulted in a victory for the Yorkists under Salisbury against the Lancastrians under Audley.

Blotting Paper. Paper specially treated to produce the maximum absorbent effect, for use in blotting ink-written matter. Other kinds of paper, as used for writing or printing, are sized by the addition of such ingredients as resin-soap; in the course of drying and rolling, the size is brought to the surface and hardened, thus preventing ink from sinking in unduly. In blotting paper, the opposite quality is required, so that the sizing ingredients are omitted or reduced to a minimum, and the other ingredients are chosen for their absorbent quality. See Paper Making.

Blouse (French). Loose garment, like an overall, fastening in front, and worn by French workmen. The loose bodice adopted by women, at first called a Garibaldi after the shirt worn by Garibaldi and his followers, is of recent date. In its earlier stages the shirt blouse was rather a stiff garment worn with a starched high collar. It was gradually modified into a more feminine style, still tailored in its cut, and into a more elaborate garment of lace, silk, etc.

Blow, JOHN (1648-1708). English composer and organist. First a chorister in the Chapel Royal when it was reopened in 1660, Blow soon began to compose. In 1669 he was made organist of Westminster Abbey, and in 1670

organist of the Chapel Royal, holding the two positions until 1680, when he resigned the former in favour of his pupil, Henry Purcell. He was also master of the children at the Chapel Royal and at St. Paul's Cathedral 1687-93, and composer to James II. In 1699 he became composer to the Chapel Royal. He died Oct. 1, 1708, and was buried in Westminster Abbey. His compositions include over 100 anthems.

Blower. Word used in engineering in several senses. It is also used for one who works at glass making, called a glass-blower, while seamen sometimes speak of whales as blowers. A blower in engineering is a device for producing a current of air. In aeronautics it is the fan which is driven from the engine of a non-rigid airship in order to pump air into the ballonets. It is also used as a colloquial synonym for supercharger.

Blowfly. This is another name for the bluebottle (*q.v.*).

Blowing Engine. Machine for directing air upon burning fuel or through molten metal, in order to increase its temperature. Sometimes called a blowing machine, a similar apparatus is used to supply air in large quantities for ventilating mines, tunnels, etc., and to create a forced draught for steam boilers.

The smelting of ores and the melting of metals call for the application of heat at a high temperature to the materials which require to be fused. The method commonly adopted consists in directing upon a mass of fuel ready ignited a greater volume of air than would reach it naturally. A simple fanning of the fire will effect this, but not adequately; and the universal practice is to direct the air upon the fuel through some form of pipe. The arrangement implies some mechanical means of forcing the air through the pipe. Such appliances are blowing engines or machines.

The earliest form of blowing machine is represented by the primitive bellows made of goats' skins as used by the early metallurgists and still found in operation in Africa and Asia. Other forms are the water bellows, the trompe, the centrifugal fan, and the Roots, the Beale, and the steam jet blowers. The most important, however, is the apparatus specifically known as the blowing engine now universally employed to provide air for blast furnaces.

Air is one of the most important raw materials in pig iron manu-

facture, for to produce 1 ton of iron in the blast furnace demands 4 tons of air, or about 125,000 cu. ft. This means that a large furnace producing 1,000 tons of iron per 24-hour working day requires nearly 130 million cu. ft. of air, and if, as is frequently the case, this air contains an average of 5 grains of moisture per cu. ft., the weight of moisture pumped into the blast furnace is of the order of 40 tons per day. Normally, however, the amount of air supplied to most blast furnaces is less than 50,000 cu. ft. per minute, or about 70 million cu. ft. per day.

The need for these large volumes of air arises from the fact that each pound of coke burnt requires between 50 and 60 cu. ft. of air. In the early days of the blast furnace the air required was supplied by natural draught, but later and in turn hand-bellows, foot-operated bellows, and bellows or cylinders actuated by water were employed as more air and higher pressures became essential. In modern plant operating at about 20-25 lb. air pressure, the air is furnished by steam- or gas-blowing engines. The steam-blowing engines may be of two types, namely, reciprocating or turbo-blowers, while the gas-blowing engines are of the reciprocating type using waste gases from the blast furnace as fuel, since they operate by internal combustion.

According to the available data the cost of operating and maintaining a gas-engine installation is about one-half that of the steam-blowing engine. In computing costs, however, it is necessary to take into account the boilers, the water required for the boilers, the feed-water purifiers and heaters, and the cost of operating pumps for steam engines, as well as the cost of washing the gas required for gas engines.

In the Bessemer converter, the blast is usually supplied by a high-pressure double-cylinder blowing engine located in the blowing house just outside the converter house on the pulpit side. These engines are most frequently of the compound vertical type, though horizontal types were formerly used. A pressure of about 20 lb. per sq. in. is maintained by means of a blow-off valve, which regulates and varies the pressure for charging the converter and for pouring, the range of pressure required being 10 to 25 lb. per sq. in. Turbo-blowers

are now more generally used on account of their lower initial cost, their greater flexibility, lower maintenance charges, and because they weigh less and occupy less space. They can also be regulated automatically in respect of air pressure and volume, an advantage not possessed by other types of blowing engines. Despite this, reciprocating cylinder blowing engines are still recommended by some authorities because of complications in superheat and partial vacuum attendant in the use of turbine operation, and because the reciprocating engine is claimed to be more uniform, more adaptable, and more economical in operation under variable service conditions. On occasion, both types are installed.

W. F. CHubb, Ph.D., B.Sc.

Blowing Room. Department of a cotton spinning mill in which raw cotton is opened from the bale. Air suction or blowing is employed to exhaust the dust from the material.

Blowitz, HENRI GEORGES STEPHANE ADOLPHE OPPER DE (1825-1903). Austrian-born French jour-



Henri G. de Blowitz.
French journalist

alist. Born at Blowitz Castle, Pilsen, Dec. 28, 1825, he taught German at Tours and later at Marseilles. His first essays as a journalist appeared at Lyons, and by

his articles he secured the defeat of De Lesseps at the French elections of 1869. His expulsion was demanded, but he obtained naturalisation as a Frenchman in 1870.

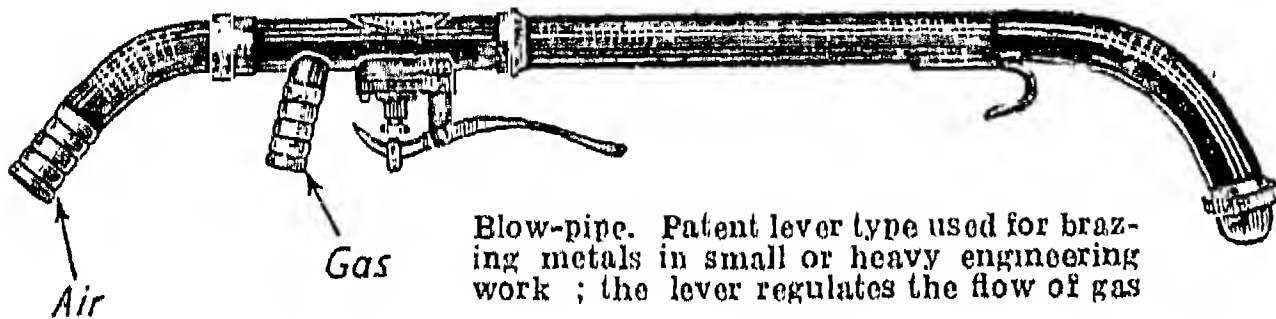
Temporary correspondent of The Times in July, 1871, he became the chief Paris correspondent, Feb. 1, 1875, and remained so until his retirement. He was able to disclose the designs of Germany against France in 1875, transmitted the text of the treaty of Berlin before it was signed in 1878, and was among the first to foresee the progress of Russia towards Herat. He died Jan. 18, 1903. Consult his *Memoirs*, 1903.

Blow-lamp. Lamp used by plumbers, electricians, and painters, in which gasified oil is burned along with air, the flame resembling the atmospheric flame of the Bunsen burner (*q.v.*). Fuels are paraffin or petrol, the first needing to be forced to the burner by air pressure. Blow-lamps are used for soft or hard soldering, the

jointing of lead pipes and sheathing of cables, and by painters for stripping paint from woodwork.

Blow-pipe. Tube with a small orifice through which a current of air is projected, either by the mouth of the operator or mechanically. The object is to direct and intensify a flame and concentrate

Blubberhouses. Village of the W. Riding of Yorkshire, England. It is 8 m. W. of Harrogate and is a grey village with rocky surroundings and a grouse moor, at an alt. of 525 ft. Here the river Washburn fills one of the reservoirs of Leeds before it flows into the Wharfe.



Blow-pipe. Patent lever type used for brazing metals in small or heavy engineering work; the lever regulates the flow of gas

its heat upon a given spot. Blow-pipes are used by goldsmiths, jewellers, and metal workers, for soldering metals; by glass workers and by chemists for oxidising and reducing purposes and in conducting dry tests. In larger and more powerful blow-pipes, a foot-operated bellows or a rotary blower is used to provide the air supply which furnishes extra oxygen to the flame and increases its heat. Gas is the fuel in these appliances. The name blow-pipe is sometimes given to the oxy-acetylene or the acetylene-air torch used for welding and fusion-cutting of metal. *See Welding.*

Blow-pipe or **BLOW-GUN.** A weapon in common use among savage tribes. It was used by the North American Indians in the 18th century, and is now used by the Indians of the S. part of the continent in hunting and warfare. It is essentially a long tube through which arrows and similar missiles may be discharged to a considerable distance by blowing with the mouth. Some tribes use hollow reeds as the gun, others ironwood bored through with a red-hot iron. Crude sights are often to be found on these weapons and the users show skill and accurate shooting up to a range of 50 or 60 yds.

In the Philippines the guns are from three ft. to four ft. long; those of the Dyaks of Borneo from six ft. to seven ft., while some of the South American specimens are 15 ft. The weight is from $\frac{3}{4}$ lb. to 1 $\frac{1}{2}$ lb. The arrows are frequently tipped with bone and tailed with natural cotton or fibre. They are generally poisoned and average about 1 ft.

Blubber. Covering of thick fat enveloping the body of whales and some other marine animals. Blubber is one of the products for which whales are hunted, and from it comes the valuable whale oil of commerce. *See Whale.*

Blücher. German armoured cruiser of 15,500 tons and twelve 8.2-in. guns, sunk in action with Earl Beatty's forces in the North Sea, Jan. 24, 1915. In 1939 a second Blücher was completed for the German navy, of 10,000 tons, a speed of 32 knots, and eight 8-in. guns, twelve 4.1-in., and twelve 37-mm. A.A. guns. She was sunk by mines in Oslo Fjord, April 9, 1940, after being disabled in action with Norwegian coastal batteries.

Blücher, (GEBHARD LEBERECHE von (1742-1819). Prussian soldier. Born at Rostock, Mecklenburg, Dec. 16, 1742, he gained his first experience of war in the service of Sweden. Later he joined the Prussian army, but retired dissatisfied with the promotion he received. In 1787 he again entered the Prussian service, and fought against France. In 1806, against Napoleon, he fought at Auerstädt and elsewhere, courageously but vainly endeavouring to stem the French advance. In 1813 he took command in Silesia and won a series of victories, culminating with that of the Katzbach, Aug. 26. He fought at Leipzig (Oct. 16-19), and led the Prussians in the advance on Paris in 1814. He was then created prince of Wahlstadt.

In 1815 Blücher was put in command of the Prussian forces; and though Napoleon defeated him at Ligny (June 16) he made good his retreat to Wavre instead of Namur to carry out his promise of supporting Wellington. On June 18 at Waterloo, the Prussian arrival upon the right flank of the French disorganized Napoleon's attack on the British line, and helped to ensure his defeat. Only the firmness of Wellington prevented Blücher from taking vengeance upon Paris. Marshal Vorwärts (Ger., forward)—the nickname of the old warrior—died on his estate in Silesia, Sept.

12, 1819. *See Waterloo; consult Memoirs, ed. Princess E. Blücher and D. Chapman-Huston, 1932.*

A once-fashionable type of heavy half-boots was called Blüchers.

Blue. Substance used to whiten fabrics during laundering. It is essentially ultramarine, made by heating a mixture of china-clay, sulphur, soda, silica, and salt-cake in a furnace. The more sulphur in the mixture, up to a certain limit, the darker the blue produced.

Blue. In sporting language, a man who has the right to wear the light blue cap and blazer of Cambridge or the dark blue of Oxford. There is a Blues committee at each university, and blues and half-blues are awarded for most representative inter-university contests. All competitors receive full blues at both universities for rowing and cricket; Rugby and Association football; and hockey. In other contests, some competitors receive half-blues: e.g. in athletics the first strings and any man whether first string or not who wins an event in the inter-university sports at the White City receive full blues, the other representatives half-blues; in cross-country running only the first man home receives a full blue. In polo, lacrosse, skiing, fencing, swimming, and billiards all competitors qualify for a half-blue. At rackets the first string at Oxford receives a full blue and the second a half-blue; at Cambridge both strings receive half-blues.

Blue Baby. A new-born infant with cyanosis, usually due to persistence of the foramen ovale, which is the opening in the foetal heart between the two auricles. Alfred Blalock (b. 1899), an American surgeon, successfully performed an operation on a "blue baby" which was later carried out on many others with success.

Bluebeard. Character in Perrault's fairy-tale of Barbe Bleue, 1697. A wealthy ruffian marries and kills six wives one after the other, hanging up their remains in a locked chamber. The seventh wife disobeys Bluebeard's command never to unlock the door of this room, and discovers the horrible secret when he is away from home. She is rescued from the fate of her predecessors by the arrival of her two brothers, who kill Bluebeard. The story occurs in the folk lore of widely different nations. Hence the original of Bluebeard is no more to be found in the Breton knight, Gilles de Rais, who, after a gallant career as a soldier, inherited vast estates and developed

into a monster of cruelty, than in Comorre the Cursed, who killed his wife, S. Tryphine, in the 6th cent.

The term Bluebeard came to be given popularly to any man notorious for monstrous crimes against women, particularly one who kills a number of brides. In 1922 the French Bluebeard, Landru (*q.v.*), was executed for the murder of 11 women, to 10 of whom he had been betrothed; Charles Chaplin based a film, *Monsieur Verdoux*, on this case. Consult Perrault's *Popular Tales*, ed. A. Lang, 1888: Bluebeard: Comorre and Gilles de Rais, E. A. Vizetelly, 1902.

Bluebell OR WILD HYACINTH (*Endymion nonscriptus*). Bulbous perennial of the family Liliaceae,



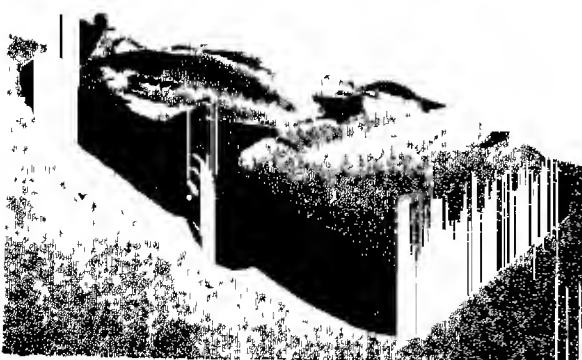
Bluebell or wild hyacinth

native to W. Europe, including Britain. The bulb is about an inch in diameter, and from it spring long strap-shaped leaves, about a foot long, and a single tall scape bearing from 6 to 12 drooping bell-shaped flowers, usually blue, occasionally white or pink.

The bluebell is a gregarious woodland plant which fills the woods in spring with sheets of blue. The bluebell of Scotland is the harebell (*q.v.*).

Blue Bird (*Sialia sialis*). Common bird of North America, allied to the thrush, often known as the blue robin. Sky-blue in colour, with chestnut throat and breast, it is a little larger than the British robin, which in habits it much resembles, being remarkably tame and building its nest in gardens and about houses. The name is also applied to the Indian genus *Irenia* and to the sooty albatross.

Blue Bird. British racing motor car and motor boat, owned by Sir Malcolm Campbell (*q.v.*).



Blue Bird. Famous racing motor car in which Sir Malcolm Campbell drove at 301 m.p.h.

Often rebuilt, the car was finally powered by two Rolls-Royce aero-engines of 2,500 h.p., and in it, in Sept., 1935, Campbell broke his own world land speed record by travelling at 301 m.p.h. on Salt Lake Flats, Utah, U.S.A. In the Blue Bird motor boat, powered by two Rolls-Royce aero-engines, Campbell attained a record speed of 141.74 m.p.h. on Lake Coniston, Aug. 19, 1939. On Sept. 20, 1956, his son Donald set up at the same place a world record of 225.63 m.p.h. with a jet-engined boat named Bluebird.

Blue Bird, THE. A play by Maurice Maeterlinck (Eng. trans. A. Teixeira de Mattos, 1909), first produced in London at the Haymarket Theatre, Dec. 8, 1909, and revived many times. It is a fanciful mingling of fairy tale and poetry, describing the adventures of a boy and girl in quest of the "blue bird," the symbol of happiness.

Blue Book. British parliamentary and consular report bound in blue paper wrappers and issued in folio form. The term is used loosely to cover other official documents, but those referring to foreign affairs and sometimes other matters are known as White Papers. The public sale of such papers dates from 1836. Yearly subscriptions are received from the public for the whole or sections of Parliamentary Papers. In the U.S.A. naval and administrative documents are known as Blue Books, and diplomatic correspondence as Red Books.

Bluebottle OR BLOWFLY (*Calliphora vomitoria*). Insect of the family Calliphoridae, and related to the common house-fly (*Muscidae*). It is larger than the house-fly, measuring about one inch across the wings, and has a blue abdomen. It lays its eggs in meat, and is a common domestic pest. In



Bluebottle or blowfly

the U.S.A. the name is applied to any large bluish house-fly that lays its eggs on flesh.

It is often confused with the flesh-fly (*Sarcophaga carnaria*), which, however, rarely comes indoors, and whose hind body is grey and black instead of blue. The flesh-fly retains its eggs until they hatch. The resultant maggots are larger than those of the blowfly.

Blue Coat School. Name given to certain English schools from the

long blue coats worn by the boys. The chief is Christ's Hospital (*q.v.*), originally in London, now near Horsham, Sussex, where the boys still retain the long blue coats, as worn by their predecessors since the time of Edward VI. They also wear yellow stockings, but no hats, although until about 1850 they wore blue caps.



Blue Coat boy in school dress

Blue Cross.

Name given to a British organization for the care of horses and dogs in warfare. Run on Red Cross lines, supported by voluntary contributions, it is a branch of Our Dumb Friends' League. It was founded in 1912 during the Balkan war. In 1917, at the request of the French government, it undertook the sole veterinary charge of the 18,000 war dogs used in the French army. During the First Great War it also worked in Italy. Between 1939 and 1945 it assisted the govt.-sponsored N.A.R.P.A.C. for the rescuing of animals rendered homeless by enemy action.

Blue Ensign. Flag of the Royal Naval Reserve. It consists of a blue ground with the Union flag in the fly or upper corner next the staff. It may be worn by merchant vessels commanded by retired officers of the R.N. or officers of the Royal Naval



Blue Ensign, flown by vessels auxiliary to the Royal Navy

Reserve, provided that at least ten of the crew are naval pensioners or belong to the Royal Naval or Royal Fleet Reserve. It may also be flown on certain vessels engaged in auxiliary naval duties. Merchant ships chartered as naval or military transports wear the blue ensign with the

yellow Admiralty fouled-anchor in the fly. Warships of the countries of the Commonwealth navies use the ensign with the appropriate dominion badge in the fly. Provided the holder owns an Admiralty warrant of authority, yachts and other private pleasure vessels (but not houseboats) registered with certain recognized clubs may fly the blue ensign.

Bluefields OR BLEWFIELDS. A town and a river of Nicaragua, Central America. The river flows E. to Bluefields Bay, on the Caribbean Sea, one of the largest and safest harbours on that coast. It is navigable for some 65 m. to Rama. The town, at the mouth of the river, has a good harbour and exports bananas and other tropical fruits and cabinet woods. The name commemorates a Dutch pirate Blewfeldt. Pop. (est.) 5,000.

Bluefish (*Pomatomus saltatrix*). Fish akin to the mackerel. Blue on the upper parts and white below, with a black spot at the base of the pectoral fin, it attains a length of 3 ft. or more. It is common in warm climates, especially on the E. coast of N. America, and is highly esteemed as food. It feeds on menhaden, squid, mackerel, and other fish, which it hunts in schools. Its size, strength, and swiftness provide a favourite sport for American anglers. It is also called skipjack and skip mackerel.

Blue Grass (*Poa compressa*). A perennial grass, native to Europe, N. and W. Asia, possibly also to N. America. The name is due to the generally glaucous hue of the plant, which prefers dry places such as banks and walls. The leaves are flat and often rough, and the flowering stems are less than 1 ft. high. The branching of the panicle is somewhat one-sided.



Blue Grass,
Poa compressa

Kentucky blue grass (*P. pratensis*), also called June grass, grows in the fertile Blue Grass region of east-central Kentucky, U.S.A., where the soil base is blue limestone. The colour of the seed vessels gives the whole landscape a bluish hue.

Blue John Mine. Natural cave near Castleton, Derbyshire, England. From it the purple fluorspar called Blue John is obtained.

Blue Laws. Phrase used in the U.S.A. for laws which interfere with personal freedom, tastes, and

habits, such as sumptuary laws and those regulating private morals. The name was first given to several laws of this kind said to have been imposed in the Puritan days of the 18th century on the inhabitants of New Haven, Connecticut. Their authenticity was disputed, but it has been found that such laws did exist in some of the New England states.

Blue Mountains. Name given to various ranges of mountains, of which the chief are: (1) A range in Surrey co., Jamaica, running E. and W. The chief range in the island, the mts. are covered with vegetation and command magnificent views. The highest point is Blue Mountain Peak (7,420 ft.). (2) A branch of the Dividing Range, New South Wales. The range runs almost parallel with the coast, in some places quite near, in others 60 m. or so away. The peaks, which average about 3,000 ft., are covered with eucalyptus forests; the highest is Mt. Beemerang, 4,100 ft. (3) A range in Oregon, U.S.A. Composed of lava on granite, it is covered with pine and fir forests. Mean alt. 7,000 ft. (4) A range in King's co., Nova Scotia.

Blue Nile. English name for the Bahr-el-Azred (*q.v.*).

Blue Nose. Nickname given to an inhabitant of Nova Scotia. Found in the novels of T. C. Haliburton (1796-1865), the creator of Sam Slick, the term is probably derived from the effect of the climate on the noses of the inhabitants.

Blue Peter. Blue flag with a white square in its centre, and signifying the letter P in the international flag signalling code. When flown on its own at a ship's mast, it indicates that the vessel is about to sail.

Blue Pill. Pill consisting of mercury 33 p.c., liquorice 33 p.c., syrup, glucose, and glycerin. It was formerly a favourite remedy for constipation with headache, furred tongue, and lassitude due to disorder of the liver.

Blue Ribbon OR RIBAND. Term for a high distinction of any kind. Its use in this connexion arises from the fact that the ribbon of the Order of the Garter is dark blue. Thus, the winner of the Derby is said to gain the blue ribbon of the turf; the lord chancellorship is termed the lawyers' blue ribbon; and the ship making the fastest Atlantic crossing between Ambrose Light, 10 m. E. of Sandy Hook, N.J., and Bishop Rock, Scilly Is., is said to hold the

blue riband. The Queen Mary won it, with an average of 31.20 knots, 1938, losing it 1952 to the United States, which took it with an average of 35.59 knots on her maiden voyage.

Blue Ribbon Army. Society of abstainers from intoxicating drinks which flourished in Great Britain during the last quarter of the 19th century, from 1883 as the Gospel Temperance Union.

Blue Ridge. Most easterly range of the Appalachian Mts., U.S.A. They extend N.E. to S.W. from Pennsylvania through Maryland, Virginia, Carolina, and Georgia into Alabama.

Blues. Form of American Negro music, closely allied to the foxtrot. Its deliberately melancholy nature can be exaggerated by flattening the third and seventh notes (the so-called blue notes) of the major scale. The chords can be varied to a certain extent, and can be played in the major or minor key according to the requirements of the melody or improvisation, but the harmonic progression follows a set pattern, the common chord of the keynote alternating with the dominant seventh of the keynote and the common chord of the sub-dominant.

Blue Sap Stain. Bluish-grey stain seen in the sapwood of certain softwood timbers, especially in Scots Pine (*Pinus sylvestris*). It is caused by a fungus, *Ceratomyces*, a member of the Ascomycetes. The attack is limited to the sapwood, since this fungus feeds on the starch contained in certain wood cells and not on the cell walls. The hyphae are found mainly in the ray cells, although occasional hyphae traverse the vertical tracheids in passing from one ray to another. In passing from cell to cell the hyphae usually pass through the pits in the cell walls, so that little structural damage is done to the wood. Blue sap stain is not incipient decay, and the chief damage to the wood is disfigurement. No dye is produced by the fungus: the discoloration is due to the presence of the hyphae within the wood. Other similar fungi may cause a similar sap-stain in other timbers. Some of the light coloured tropical hardwoods are very commonly attacked: the warm, moist conditions in tropical woodlands favour fungal growth. The commonest times for attack are either immediately after felling, when the ends of the log are drying out, or after conversion, before the surface

of the planks has dried sufficiently to prevent fungal growth. Standing trees are rarely attacked. Once the timber has been seasoned, the fungal growth stops. Sapstained timber can be safely used if it is stained or painted, or where the discoloration is of no account.

Blue Shark (*Carcharinus*). A genus of shark common in tropic and sub-tropic seas. Slaty blue on the upper parts and white beneath, some species attain a length up to 25 ft. Large specimens are dangerous to bathers and a serious nuisance to fishermen. Its dried



Blue Shark. A deep-sea shark sometimes seen off the S. coast of England

skin forms shagreen. The name is also applied to the American porbeagle (*Lamna punctata*).

Bluestocking. Word applied derisively to a learned woman. In England its modern use originated about 1750, when certain persons, weary of the usual amusements of London society, began to hold meetings for conversation on books and letters. Mrs. Elizabeth Montagu was a leading figure in this circle, which included Horace Walpole and Lord Lyttelton: and one or two of its male members, to mark their freedom from convention, wore blue stockings instead of the customary black silk.

Those who thus met were called bluestockings; but in course of time the term became confined to the women members. Boswell describes the origin of these clubs, and Byron and other writers in the early part of the 19th century popularised the term in this sense; but with the growing emancipation of women a learned woman was no longer regarded as abnormal.

In 1653 the members of Barebone's Parliament were called bluestockings, presumably on account of the plainness of their dress. A still earlier origin is claimed for the word. About 1400 there was established at Venice a literary society, the members of which were called bluestockings because of their attire. The term was used in France in the 18th century for ladies of literary tastes, and this may have led to its use in England.

Bluethroat (*Luscinia svecica svecica*). Small bird akin to the nightingale. It has a bright blue throat adorned with a reddish brown patch. It breeds in

Scandinavia, Siberia, and other northern lands, and in winter migrates, usually in a single flight, to Egypt, Abyssinia, and India, being a rare visitant in the intervening countries. It is also known, from its song, as the Swedish nightingale, and in Lapland, from its mimicking the notes of other birds, as the bird of a hundred voices.

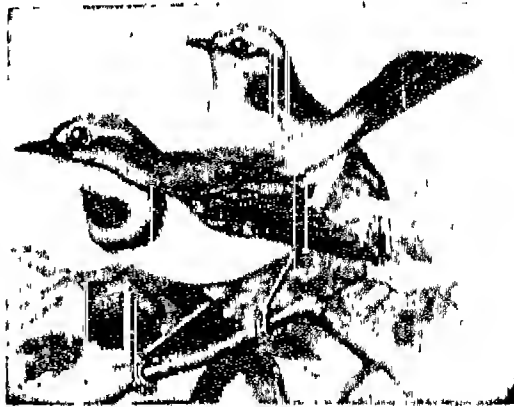
Blue Vinny. English cheese, made in Dorset, and thus sometimes known as Blue Dorset. It is made from skim milk, and belongs to the great family of hard white cheeses with blue veins. Here the veins run horizontally, which gives a distinctive appearance. The word vinny means mould. The manufacture has never been taken from the farms to the factories, and Blue Vinny is rarely obtainable outside Dorset.

Blue Water School. Name formerly given in Great Britain to advocates of a strong navy. Their argument was that Great Britain's main defence lay on the sea, and that therefore for the British the maintenance of an army was of only subsidiary importance.

Bluff (old Dutch *blaf*, flat). Low cliff or high bank with a steep face. The middle and lower courses of the Mississippi are bordered by a flood-plain behind which rise steep-faced bluffs. Many of the most important towns on the banks of that part of the river, such as Memphis and Vicksburg, are situated where it swings against these bluffs, since such a position affords a good crossing and bridging point.

Bluff. Port of Southland co., South I., New Zealand. The most southerly point of the Island on Foveaux Strait, it is the first harbour on the south route from Australia to Lyttelton. The port is 17 m. by rly. S. of Invercargill. Pop. (1951) 2,253.

Blum, ERNEST (1836-1907). French dramatist. Born in Paris, Aug. 15, 1836, he became a journalist, writing for *Charivari*, *Le Gaulois*, and other periodicals. As an author he wrote *Une Femme qui Mord*, and a number of dramas followed, some of them written in conjunction with Monnier, Labiche, and others. These include *Rose Michel*, by which in 1877 he made his reputation; *Les Femmes Nerveuses*, 1888; *Le Carillon*, 1897; and *Un Soir d'Hiver*, 1903. He died Sept. 18, 1907.



Bluethroat, a song bird of N. Europe and Asia

Blum, Léon (1872-1950). French statesman. Of Alsatian-Jewish extraction, he was born in Paris, April 9, 1872, and educated at the *École Normale*. A civil servant from 1895, he

was a regular contributor to *L'Humanité* from its foundation in 1904. Chairman of the Socialist party 1919, in that year he was elected deputy for a Paris constituency, in 1929 for Narbonne. The Communist wing of the Socialist party broke away in 1920, taking *L'Humanité*; Blum took over *Le Populaire* in 1921 and made it a power. With M. Cachin he inaugurated the "popular front" in 1934. As prime minister

1936-37, he introduced the 40-hr. week and holidays with pay. Premier again March-April, 1938, he proposed drastic financial reforms, rejected by the senate.



Léon Blum, French statesman

Arrested by the Vichy govt. in 1940, he was brought to trial at Riom (*q.v.*) in 1942. Interned at Bourrassol, France, and then, 1943 in Buchenwald, he was freed, 1945, from the Praxer Wildsee camp, near the Brenner, by the Allied 5th army. Early in 1946 he carried out a successful financial mission in Washington; and during Dec., 1946 Jan., 1947, was head of a caretaker Socialist govt. pending the election of the first president of the fourth republic (Auriol). He died March 30, 1950. His book, *Du Mariage*, 1907, gained much attention.

Blum, ROBERT (1807-48). German politician. Born at Cologne, Nov. 10, 1807, he became a writer and in 1847 started a bookselling business in Leipzig. In the revolution of 1848 he was the leader of the democratic party in Saxony. Carrying congratulations to the Viennese insurgents, he took part in the rising, and was arrested and shot, Nov. 9, 1848.

Blumenbach, JOHANN FRIEDRICH (1752-1840). A German anthropologist. Born at Gotha, May 11, 1752, he studied medicine at Jena and Göttingen. As pro-

fessor of medicine and anatomy at Göttingen, 1778-1835, he published manuals of natural history, 1780, and of comparative anatomy and physiology, 1804. His descriptions of human skulls, 1790-1828, amplified his view, propounded in 1781, that mankind is classifiable into several families, Caucasian or white, Mongolian or yellow, Malayan or brown, Negro or black, and American or red. This view, with modifications, has met with wide acceptance. Blumenbach died at Göttingen, Jan. 22, 1840.

Blumenfeld, RALPH DAVID (1864-1948). British journalist. Born at Watertown, Wisconsin, April 7, 1864, he was a reporter on the Chicago Herald, 1884. He came to Europe in 1890 as London correspondent of the New York Herald, settled in England in 1900, and became news editor of the Daily Mail during that year. He was naturalised c. 1905. As editor of the Daily Express, 1902-32, and later as its chairman, he became one of the best-known figures in the newspaper world. He founded the company of Newspaper-Makers (amalgamated with the Stationers' company, 1934). His books include R.D.B.'s Diary, 1930; The Press in My Time, 1933; R.D.B.'s Procession, 1935; Home Town, 1944. He died at Dunmow, July 17, 1948.

Blümlis Alp. Snow-and-ice-clad mountain mass of the Bernese Oberland, Switzerland, near Kandersteg. To the W. rises the Blümlisalp horn, alt. 12,040 ft.; to the E. is the Morgenhorn, 11,905 ft.; and in the centre, the Weisse Frau (White Lady), 12,010 ft.

Blundellsands. Suburb of Liverpool, lying 6 m. N.W. on the Mersey estuary. It has a golf course, and general amenities of a quietly prosperous district.

Blundell's School. A public school at Tiverton, Devon, England. Built and endowed by Peter Blundell (1520-1601), a clothier, and opened in 1604, it became one of the best known schools in the West of England. In 1876, its revenues having increased, a new scheme for its management was drawn up, and in 1882 the school moved to a site above the Exe valley. The number of boys is about 300, and there are school scholarships to

Balliol, Oxford, and Sidney Sussex College, Cambridge. R. D. Blackmore (who introduces the school into Lorna Doone), and Archbishop Frederick Temple were educated here. Consult Blundell's, F. J. Snell, 1929.

Blunden, EDMUND CHARLES (b. 1896). British poet and man of letters. Born Nov. 1, 1896, he was educated at Christ's Hospital and Queen's College, Oxford. He served in the First Great War and his Undertones of War, 1928, was one of the most widely appreciated of books about that war. Early in the 1920s he established himself as a poet of distinction, identified with the Georgian group. He was professor of English literature, Tokyo University, 1924-27, and tutor in English literature, Merton College, Oxford, 1931-43. Awarded the Hawthornden prize, 1922, he published two collections of his poems, first series, 1914-30, second series, 1930-40. Other works include The Bonadventure, 1922; On the Poems of Henry Vaughan, 1927; Nature in English Literature, 1919; life of Leigh Hunt, 1930; The Face of England, 1932; Charles Lamb and his contemporaries, 1934; Thomas Hardy, 1942; Cricket Country, 1944; Shelley, 1946.

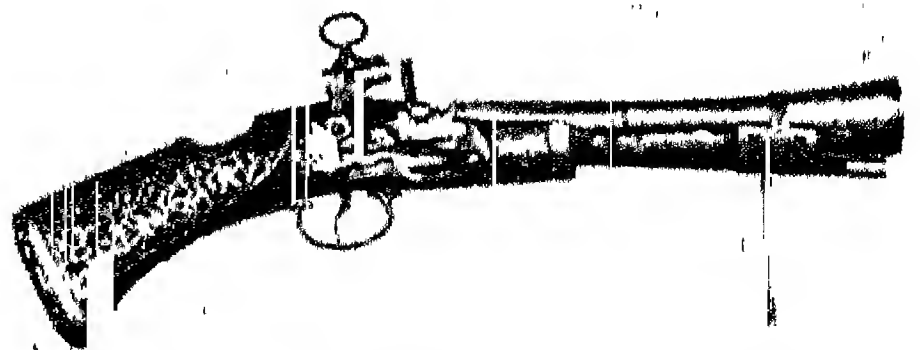
Blunderbuss (Dutch *donder*, thunder; *bus*, gun barrel). Heavy pistol carbine with flint-lock trigger action and sometimes a bell-shaped muzzle. It was in use in the 18th century; the length of barrel varied from 14 to 28 ins. It fired a number of lead slugs at each charge, making a very loud report.

Blunt, WILFRID SCAWEN (1840-1922). British poet. Born Aug. 17, 1840, he was the son of a soldier and landowner, whose Sussex estate at Crabtree he inherited in 1872. Educated at Stonyhurst

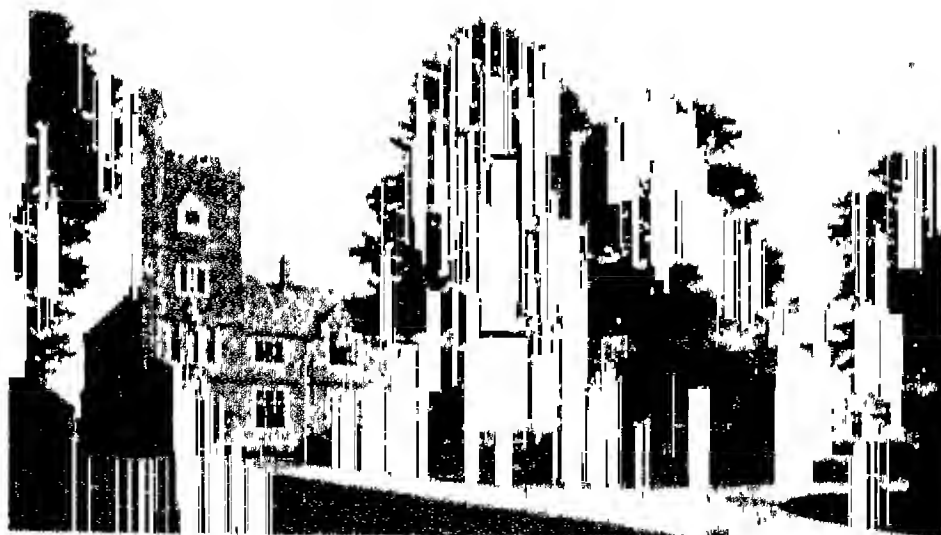
and Oscott, he was in the diplomatic service, 1858-70. Some years of travel in Asia and Africa followed, during which he became a strong advocate of political freedom for Mahomedan peoples and an opponent of British policy in the East. He published The Future of Islam, 1882, by which time he had become prominent for his support of the Egyptian nationalists. Later he was an unsuccessful candidate for parliament, and in 1888 was imprisoned in Ireland for holding a forbidden meeting in defence of evicted farmers. He was a breeder of Arab horses. As a poet he succeeded best with the sonnet. A complete edition of his poems appeared in 1914; he published his Diaries 1919-20. He died Sept. 10, 1922.

Bluntschli, JOHANN KASPAR (1808-81). Swiss-born German jurist. Born at Zürich, March 7, 1808, and educated there and at Bonn and Berlin, during 1830-47 he stood for constitutional liberalism, and for a time was president of the Swiss council of state. He left Switzerland on the overthrow of the council in 1847, and was professor of constitutional law at Munich, 1848-61, from 1868 at Heidelberg. Becoming a naturalised German, he again entered politics. He died Oct. 21, 1881.

Bluntschli wrote on Swiss and later on German constitutional questions, and a history of general



Blunderbuss. A 17th-century Spanish specimen, with decoration of pierced and engraved silver



Blundell's School, Tiverton, Devon. View of the school buildings erected in 1876

constitutional law, 1864. A member of the Brussels conference on international law, he published Das moderne Kriegsrecht (the modern law of war), 1866 and Das moderne Völkerrecht (the modern law of nations), 1868. Another well-known work was Allgemeines Staatsrecht, 1852 (Eng. trans., Theory of the State, 1885).

Blyth. Borough, seaport, and seaside resort of Northumberland, England. It stands at the mouth of the river Blyth 14 m. N.E. of Newcastle-upon-Tyne and is served by rly. It exports coal, and has shipbuilding and repairing yards. Its harbour is at North Blyth, on the opposite side of the river. The beach is sandy for 3 m., and the W. pier, a mile long, is a

favourite promenade. The 18th-century mansion Seaton Delaval, built by Vanbrugh, is near by. Pop. (1951) 34,747. Blyth gives its name to a borough constituency.

Blyth. Village of Nottinghamshire, England. It stands on the Ryton, 6 m. N.W. of Retford. Of consequence in the middle ages, it had markets, a fair, and a tournament ground. A school doorway here is 700 years old. The Norman church contains part of a priory built 1088 and thought to have been modelled on the French abbey of Jumièges; there are many additions from later periods.

B'nai B'rith, INDEPENDENT ORDER OF. Jewish fraternal organization. It was founded in New York in 1843 by Jews of German origin, to promote charity and brotherly love among the Jews. Run on masonic lines, it operates in Europe and the East as well as in the U.S.A., and has founded many hospitals, orphanages, etc.

Boa. Genus of large snakes found in tropical America and in

kingdom, rendering it easy for the Christians to capture Granada in 1492. Afterwards Boabdil joined his kinsmen in Africa, where he is said to have been killed in battle. At a spot in the Alpujarras called the Last Sigh of the Moor, he is supposed to have looked for the last time on Granada. His name is a corruption of Abu Abdallah.

Boadicea OR **BOUDICCA** (d. A.D. 62). Queen of Prasutagus, king of the Iceni, a tribe of E. Britain. To safeguard his kingdom and family, Prasutagus had bequeathed his property jointly to his daughters and the Roman emperor Nero, but at his death his territory was seized by the Romans, his widow was scourged, and his daughters were ravished. Boadicea, at the head of a host, burned Camulodunum (Colchester), Verulamium, and London, and severely defeated the Romans, but was eventually overthrown by the governor-general Suetonius Paulinus. The queen poisoned herself after the battle. Her memory is preserved in the poems of Cowper and Tennyson, John Fletcher's tragedy *Bonduca*, and a colossal group of the queen and her daughters in her war chariot by Thomas Thornycroft at the W. end of Westminster Bridge. Boadicea is the Latinised form of Boudicca.

Boanerges. Term applied by Christ to

James and John (Mark 3). It is explained as meaning sons of thunder, but the derivation is doubtful. There is a character of this name in Shaw's play *The Apple Cart*. See James, Saint; John, Saint.

Boar, WILD (*Sus scrofa*). Name given generally to all the wild members of the pig family, but especially to the wild swine of Europe and India, the progenitors of most, if not all, domesticated breeds. The European wild boar has a high crest on the shoulders, large tusks, and thick coat of coarse bristles. Standing about 3 ft. in height and swift and powerful, it occurs in damp forests and marshy districts, where it feeds upon roots, fungi, and berries.

The wild boar is found in most of the suitable districts of Europe, in N. Africa, and W. Asia. Formerly common in Great Britain, its remains are often found in peat deposits. It was living in Chartley Forest as late as 1593. King



Boar. A specimen of *Sus scrofa*, the wild boar of Europe

James I hunted it in Windsor Forest in 1617, and it is said that the last really wild specimen in Staffordshire died in 1683. In Scotland and Ireland it probably lingered a little later. The extinction of the animal as a wild species was due to domestication, rather than to extermination.

The wild boar has long been a favourite animal of the chase, and its flesh—especially the head—is highly esteemed for the table. Queen's College, Oxford, maintains an old custom of having the boar's head brought ceremonially to the high table at the banquet on Christmas Day, a carol being sung during the procession.

Board. Literally a piece of wood. Figuratively the term is applied to bodies of men responsible for the conduct of businesses, charities, etc., called boards of directors, or to certain public departments, e.g. the board of Trade, boards of Admiralty, the root idea being that officials sit round a wooden table to discuss their business. Board, in the sense of providing food, is a cognate meaning.

Boarding-House. A private house at which paying guests are provided with board and lodging, including the occupation of rooms in common with others. A boarding-house keeper has no lien on a guest's belongings, and may refuse an intending boarder, even if there is room in the house; and must take reasonable care of guests' property in the house.

Boarding Out. System by which a child in the care of a local authority may receive maintenance and accommodation by being placed in the charge of a private person. Under the Children's Act, 1948, it is the duty of a local authority to take into its care all children who have no parent or guardian, and generally all children whose welfare makes such intervention necessary. Once a child is in the care of the local authority it normally remains until 18. The authority must either board the child out or place it in a home. This system is under control of the home secretary, who



Boa. The boa-constrictor (shown here) is a large snake native to tropical S. America

F. W. Bond

Madagascar. The common boa-constrictor of S. America, which sometimes attains a length of 12 ft., is handsomely marked with spots and bars, the prevailing colours being brown, with black and yellowish markings. Coiled on the branches or round the trunk of a tree, where its colouring serves to conceal it from observation, the boa lies in wait for birds and such animals as rats and agoutis. Its skin is made into fancy leather, and the flesh is esteemed a delicacy in S. America. The boa is not poisonous; it kills by twisting its body round its prey and squeezing.

Boabdil (d. c. 1495). Last Moorish king of Granada. He seized the throne, in 1482, from his father, whom he drove into exile. Fighting against the Castilians he was taken prisoner, but regained his freedom on becoming a vassal of Ferdinand and Isabella. Troubles with his father, who desired to regain the throne, weakened the

can make regulations for the welfare of the children, securing that they are boarded out only in households approved by the local authority; that children and premises are periodically inspected; that the persons in charge either are of the same religious persuasion as the child or undertake that it will be brought up in that persuasion.

Board of Trade Journal. THE British official weekly publication. Founded Aug., 1886, as a monthly, it became a weekly publication in Jan., 1900. Although officially the organ of the board of Trade, it is the chief medium through which all government departments concerned with trade, at home and abroad, make their announcements. A world-wide information service from H.M. officers overseas gives changes in customs, tariff, and export and import regulations of overseas countries. The journal publishes authoritative appraisals of markets abroad, trade and financial arrangements made by the U.K. and other countries, and details of exhibitions and fairs. Its statistical articles cover Great Britain's overseas trade, the trade of the sterling area, movements in import and export prices, wholesale prices, retail trade, production of textiles, the film industry, shipping, travel, and tourism.

Board School. Name given in England and Wales to the elementary schools established and controlled by the school boards set up under the Education Act of 1870. After the abolition of the boards by the Education Act of 1902 the name fell into disuse. The schools were taken over by the municipal and county councils, and became known as council or public elementary schools until later reorganization of the school structure in the 1930s and after 1944.

Boar's Head. Tavern in London, famous for its associations with Shakespeare. It was in Eastcheap, and the dramatist makes it the haunt of Prince Henry and

Falstaff and their companions. It was destroyed in the fire of 1666, but a new one was built which was removed to improve the way to London Bridge. A statue of William IV stands on the site, which is near the Monument.

Boar's Hill. Locality in Berkshire, England, 3½ m. S.W. of Oxford. It has been a favourite place of residence for writers and poets, including Robert Bridges, Gilbert Murray, and John Masefield.

Boat (A.S. *bot*). Small undecked vessel propelled by oars, sail, or motor. History does not record when the first boat took the water, but the most primitive tribes known today use some kind of vessel for crossing streams and rivers. Man's first boat was doubtless a floating log, from which it was an obvious improvement to lash a number of logs together to form a raft upon which goods and non-swimmers could be transported across a river.

From the raft to the canoe hollowed out of a tree trunk was a big step in the evolution of the boat. The usual procedure was to shape the outside of the log with stone axes and then burn out the interior. Burning out occupied several days, as the fire had to be shifted from place to place and the wood damped to guide its course. The charred interior of the dug-out was then smoothed by rubbing with stones.

Two properties are essential to the most primitive of boats, stability and buoyancy. As the early boat builders failed to grasp that stability depends upon hull-shape and the provision of a keel, they achieved a certain stability by means of an outrigger: a thin log somewhat shorter than the canoe and attached to it by means of spars jutting out from its side. Such boats are called catamarans and are still used extensively by natives of New Guinea and the South Sea islands; it is almost impossible for them to capsize.

The next important advance in boat-building was to construct a framework of wood and cover it with bark or animal skins. A boat of this type was the coracle which the ancient Britons were using at the time of the Roman invasion: an open, saucer-shaped vessel usually just large enough to hold one man. A skin was stretched and fastened over a framework of thin and pliable branches laid across one another, and then bent upwards to form a bulwark. Coracles are still used by fishermen on Irish and Welsh

lakes. Somewhat similar is the goofah used on the Tigris and Euphrates: a large basket woven from willow twigs and covered with bitumen to make it watertight. The oomiak is used by the Eskimos for transport when unable to use the kayak (*q.v.*).

The greatest perfection in canoe-building was achieved in the birch-bark canoe of the N. American Indians. It was made by covering a light but tough framework of wood with sheets of birch bark, which were sewn together with fibres and waterproofed in the seams with resinous gums. In 1937 a planked boat stitched with yew withers, and estimated to be 2,000 years old, was discovered at N. Ferriby on the Humber.

All the early types of boats were propelled by paddles, but the desire for greater stability and speed, particularly when boats were used in primitive warfare, laid the foundations of modern boat-building. Hence the development of the typical cross-section in hull construction, where the portion below water-level is narrowest. The adoption of cross-section in turn demanded keels and ballast. Facility of control by the aid of a sweep or tiller permitted the use of oars and the evolution of the rowing boat. To obtain still greater speed, the front of the boat was sharpened with a prow or bow, and further improvements in the horizontal and cross sections led to the rowing and small sailing boat of today.

Boats for River Navigation

Narrowness and small draught are characteristic of boats for river navigation, whether in the racing shells used by a University oarsman or in the native fishing boats on the Congo. Width and depth characterise sea boats, such as lifeboats and the dories used by deep-sea fishermen off the Grand Banks. Such boats are either carvel-built or clinker-built; a carvel boat has the edges of the planks laid flush, and in a clinker-built boat they overlap. In the ordinary rowing boat the rower uses two oars or sculls. The difference between an oar and a scull is that the latter is shorter, lighter, and has a more concave blade. Sculls are always used in pairs, whereas in large rowing boats the crew use one oar apiece. A typical heavy rowing boat is the whale-carried on warships and the lifeboats with which merchant ships are equipped. One-man skiffs are extremely light boats of long, narrow build, with strong



Boar's Head Tavern. The sign built in the wall of the inn at Eastcheap, erected after the Fire of London

seats and outrigger rowlocks. The seat is set on rollers and by moving forward as the oarsman pulls gives a longer stroke.

Light boats used on inland waters are generally called skiffs, and the heavier ones used on the sea rowing boats. A dinghy is shorter and much broader in the beam than a rowing boat, and normally has a single pair of rowlocks. Dinghies are carried by small yachts as tenders and are used as pleasure boats on inland waters. Rubber dinghies inflated by air form part of the equipment of aircraft should the crew be obliged to abandon their aeroplane forced down over the sea. Probably the highest form of the rowing boat was the Roman galley.

At a fairly early period in the evolution of the boat some type of primitive sail was hoisted to assist the oarsman. The Egyptian dhow, still to be seen navigating the Nile, provides an example. The Viking boats were propelled by oars and sails, and the open sailing boats used for inshore fishing are modern examples. As sailing boats increased in size they were given decks, when they ceased to be boats and became ships (*q.v.*).

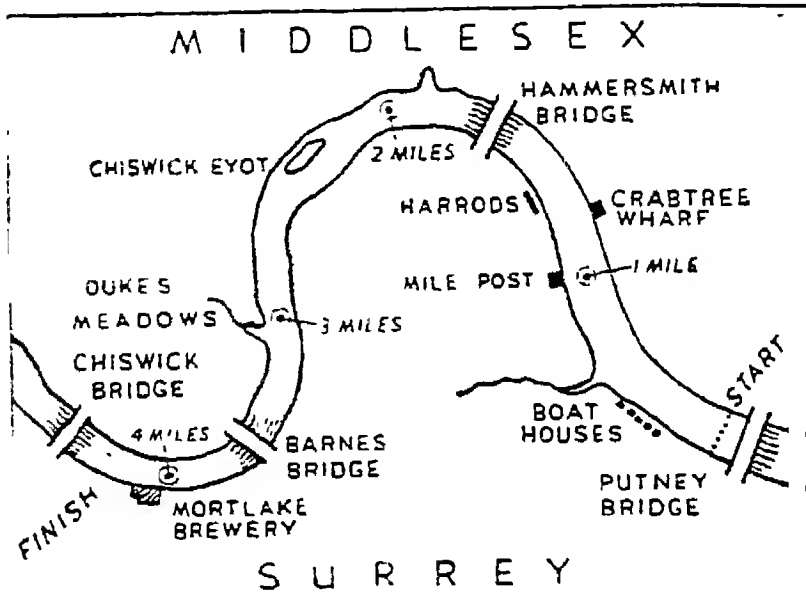
With the development of the light marine petrol and Diesel engine a new source of power was made available for open boats. Motor-boats are broadly classified according to the type of hull and position of the engine. The displacement type has a bow that cuts through the water and sits low enough to displace its own weight. For high speed on smooth water the hydroplane boat (*q.v.*) is used; this has a flat bottom which is generally stepped. Motor-boats are further classified as those which have the engine inside the hull, driving the propeller through a shaft, and those which have engine and propeller in a single unit fixed outboard over the stern. Consult *Water Transport; Origins and Early Evolution*, J. Horsell, 1946. See illus. pages 1241-44.

Boatbill (*Cancroma cochlearia*) Species of night heron peculiar to S. America and found chiefly in Brazil. Its broad flat beak suggests the shape of an inverted boat. It feeds chiefly upon fish.

Boatman (*Noto-necta*). Name popu-

larly given to a group of hemipterous insects, of which the water boatman on British ponds is a familiar example. They swim on their backs on the surface of the water, and propel themselves by their oar-like hind legs.

Boat Race. Any race between boats, but especially the annual contest between the universities of Oxford and Cambridge. In



Boat Race. Plan of the course for the annual contest between Oxford and Cambridge universities

this each crew consists of eight oars and a coxswain. The race was instituted in 1829, became an annual event in 1856, and takes place in March or April, usually on a Sat., on the Thames over a course of 4½ m. from Putney to Mortlake. Including 1956, Cambridge had won on 56 occasions and Oxford on 45. There was a dead-heat in 1877. Cambridge set up a sequence of 13 victories, 1924-36, and in 1948 broke the record for the course in 17 min. 50 sec. During the Second Great War substitute races were rowed at Henley and Ely. Consult official Centenary Hist., comp. G. C. Drinkwater and T. R. B. Sanders, 1929.

Boatswain (A.S. *bat-swan*, boat servant). Special duties officer in the Royal Navy; an officer in the merchant navy, in which the boatswain does not keep watches, but is analogous to a foreman in charge of the deck crew. A boatswain in charge of the ship's boat, or tender, is first mentioned early in the 15th century. Later

he became chief seaman on board ship, responsible for rigging, cables, cordage, anchors, sails, boats, and stores.

Boatswains in the Royal Navy "pipe" the men to duty on an instrument called a "call." They take into custody those

sentenced to detention; and, in the days of flogging, supervised corporal punishment. They are selected for special duties from the lower deck, usually between the ages of 25 and 34. Commissioned boatswains wear a thin ring of gold lace on the sleeve, which becomes a thick ring when they are promoted to senior commissioned boatswain. Pron. bōs'n.

Boavista OR BUENA-VISTA (Port., Span., fine view). Easternmost of the Portuguese Cape Verde Islands, which lie 350 m. off the W. coast of Africa. Dry and ill-cultivated, it produces salt. It has three good harbours. Pop. (est.) 5,500.

Boaz. One of the two symbolical bronze pillars of Phoenician design which stood in front of Solomon's temple. Its companion was named Jachin. (Con-

sult 1 Kings 7; 2 Chron. 3; Jer. 52.) Some commentators suggest that the pillars were huge candelabra.

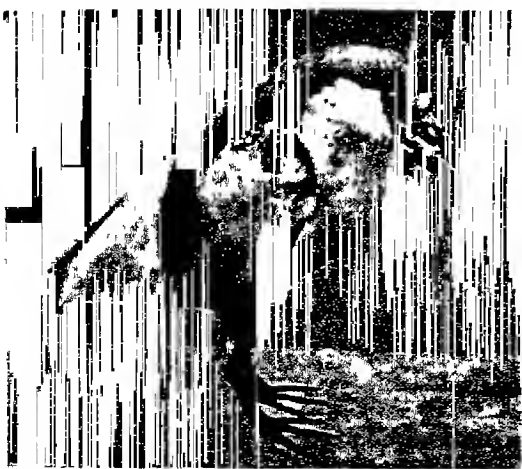
Boaz. Bethlehemite and kinsman of the first husband of Ruth whom he married under the obligations of the Levirate law. The father of Obed, who was grandfather of David, Boaz was an ancestor of S. Joseph (Matt. 1) and therefore of Jesus Christ.

Bobadil, CAPTAIN. Character in Ben Jonson's *Every Man in His Humour*. He is a braggart, fond of bombastic language.

Bobbili. A town of Andhra, India, in the Vizagapatam district. It lies 68 m. N. of Vizagapatam. An ancient town, it was captured by the French under Gen. Buss, 1756. Pop. 17,000.

Bobbinet OR BOBBIN NET. A machine-made imitation of pillow lace, so called because the threads are wound on bobbins. The hand-operated bobbinet machine was invented in 1809 by John Heathcoat, who set up the "Old Loughborough," so named from his place of residence near Nottingham. Powered bobbinet machines were introduced in 1818.

Bobbio. City of Italy, in the prov. of Piacenza, 27 m. S.W. of Piacenza. The abbey church is dedicated to S. Columbanus, who founded an abbey here in 612. The library contained a large number of valuable MSS., some later removed to the Vatican, others to the Ambrosian library, Milan. Pop. (1951) 6,468.



Boatbill. *Cancroma cochlearia*, South American night heron

Bober. A river of Silesia. Rising in the Riesengebirge in Silesia, it flows N.W. to the Oder, near Krossen. It is about 175 m. long and unnavigable.

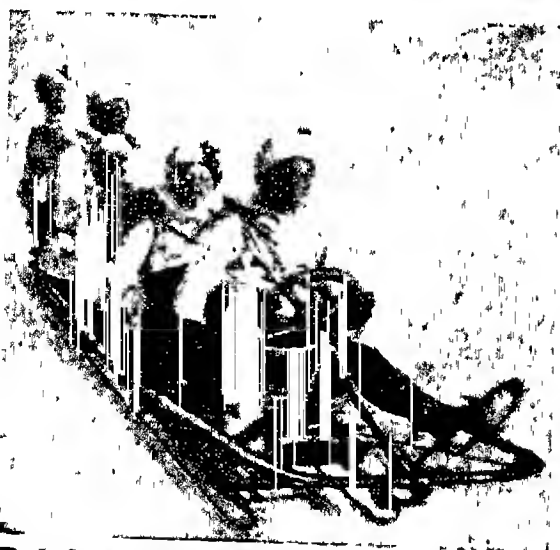
Boblingen. Town of Germany, in Württemberg. It is 16 m. by rly. S.W. of Stuttgart, manufactures sugar and chemicals, and produces hops. Pop. 6,018.

Bobolink. Local name given to the rice bunting (*Dolichonyx oryzivorus*), a migratory song bird of North America. It spends the winter in Central America and the West Indies, and returns to the U.S.A. for the summer. The name is supposed to represent its song.

Bobrinets. Town of Ukraine S.S.R., in Kirovograd region. It is on the Bobrinets, a tributary of the Bug, 75 m. N. of Nikolayev. It manufactures flour and tobacco, and trades in cattle and grain.

Bobruisk. Fortified town of White Russia S.S.R. The capital of a region of the same name, it is on the Beresina, 105 m. by rly. S.E. of Minsk. It has a college, a hospital, ironworks, and flour-mills, and exports timber and grain. It was unsuccessfully attacked by the French in 1812, and damaged by fire in 1902. Stubborn fighting took place in this area in mid-July 1941, and by the end of the month the German advance had swept past Bobruisk. When it was recaptured, June 29, 1944, 16,000 Germans were killed. Pop. (est.) 85,000.

Bobsleigh or BOB-SLED. Sporting sledge of simple form, for two or more sitters, used for "coasting." The front part is controlled by a steering wheel or sometimes by ropes, those behind aiding the steering by swaying to either side and by digging into the snow alongside with their heels.



Bobsleigh. The start on the Cresta Run of the Grand Sports, St. Moritz

Bocage, MANUEL MARIA BARBOSA DE (1765-1805). Portuguese poet. Born at Setubal, Sept. 15, 1765, the son of a government official, he joined the army in 1779, but transferred to the navy in 1786. He was already well known in Lisbon for his verses when he was sent to Daman, Portuguese India, in 1789. Unable to stand the boredom of garrison life, he deserted, and travelled in China, visiting Macao. He returned to Portugal in 1790

and joined a literary circle, the "Nova Arcádia" (new Arcadia). In 1797 he was imprisoned on account of his revolutionary and irreligious verses. On his release he lived chiefly by hack work, and after a long illness died in extreme poverty, Dec. 21, 1805. Although Bocage's best poems were sonnets, he had unusual gifts of improvisation and satire.

Boccaccio, GIOVANNI (1313-75). Italian author. He was the son of a merchant of Florence, and was probably born in that city, though some biographers say Paris. While still a boy he was put into a mercantile office, but at the age of 15 was sent to study law at Naples. There an early bent towards literature became intensified.



Giovanni Boccaccio, Italian author After Van Dalen

About the age of twenty-five he fell in love with Maria d'Aquino, supposed to be a natural daughter of King Robert of Naples, who inspired much of his early work in prose and poetry. In 1340 he was recalled to Florence by his father, but in 1345, on his father's remarriage, returned to Naples. In 1348 there was a severe pestilence at Florence, and Boccaccio possibly had begun the writing of his

Decamerone (completed c. 1353) when, 1349, he was again recalled to Florence by his father's death from the epidemic.

About this time, or possibly a few years earlier, began his friendship with Petrarch, one of whose last literary labours was the translating into Latin of Boccaccio's Patient Griselda, and under whose influence he became one of the leading agents in promoting humanistic studies. About 1362, influenced by Petrarch and by a dying priest who almost scared him into renunciation of the world, he changed his moral views and conduct, and afterwards his writings were free from much of the licence which had marked his earlier work. In 1363 he settled at Certaldo, his paternal inheritance some miles from Florence. In 1365 he was sent on a mission

to Avignon, and two years later to Rome. He was appointed to deliver a series of public lectures at Florence on Dante who shared with Petrarch his homage and while engaged upon these he died Dec. 21, 1375.

The position occupied by Boccaccio in modern literature is a very high one, for though he is chiefly remembered by *The Decameron*, he revived or established several literary forms.

In *Ameto* and *Fiammetta* he wrote prose stories, in which the author and his lady are supposed to be presented as the hero and heroine. The latter story was described by Richard Garnett as being the precursor of the psychological novel. By *The Decameron* he took his place as creator of Italian classic prose. The chief of his Latin works were treatises on ancient mythology (*De Genalogiis Deorum Gentilium*) and on geography (*De Montibus, Silva, Fontibus, etc.*). See *Decameron*; consult also Boccaccio as Man and Author, J. A. Symonds, 1896; Lives, W. P. Ker, 1900; E. Hutton, 1910; T. C. Chubb, 1930; *The Tranquil Heart: Portrait of Boccaccio*, C. Carswell, 1937.

Bocca Tigris, THE TIGER'S MOUTH, OR THE BOQUE. Narrow channel at the N. end of the estuary of the Canton river, Chukiang, S. China. It contains the heavily fortified islets called the Bogue Forts, captured by the British, 1841 and 1856.

Boccherini, LUIGI (1743-1805). Italian composer. Born at Lucca, Feb. 19, 1743, he studied the cello with his father, a bass player, and the Abbé Vannucci. He showed such ability that he was sent to Rome, where he soon became famous as a composer and player. He toured Italy with Filippo Manfredi; went to Paris, where he became the rage; and in 1789 he visited Madrid, but did not achieve such success. Later he often suffered distress and want. He wrote a great deal of chamber music, and his instrumental works numbered 467. He died at Madrid, May 28, 1805.

Boche. Contemptuous term for a German, popularised during the First Great War. Its origin is traced to the Parisian slang termination *-boche*, cf. *bambuche* (boozing). With this ending the French word for a German, *Allemand*, becomes *Alboche*, a common substitute in France since 1870, and *les Alboches*, the Germans, was punningly distorted into *les sautes Boches*, the dirty Germans.

Bochnia. Town of Poland, in Cracow prov. It is 22 m. E.S.E. of Cracow, and has large salt mines in deposits of rock salt near by estimated at 50,000,000 tons. Pop. (1946) 10,072.

Bocholt. Town and district seat of W. Germany, in N. Rhine-Westphalia. It stands on the river Aa, four miles from the Dutch frontier, and is a cotton-manufacturing centre. Pop. (1954) 41,015.

Bochum. Town of Germany, in N. Rhine-Westphalia, about 10 m. E. of Essen. It has important coalmines and large iron and steel industries. The manufacture of carpets, bricks, and beer is also carried on. Its educational establishments include a school of mining. One of the much-bombed Ruhr targets of the Second Great War, it fell to U.S. armoured troops, April 11, 1945. Pop. (1954) 332,856.

Bock, FEDOR VON (1880-1945). German soldier. Born at Küstrin, Prussia, Dec. 4, 1880, he was a staff officer in 1918 and a member of Hindenburg's headquarters during demobilisation. In 1922-24 he organized the illegal "black Reichswehr," financed by magnates, of ill-fame in connexion with the Feme murders. A brilliant strategist, he was chosen by Hitler as a commander against Poland and in the west, 1939-40, and was made field-marshal after the defeat of France. He led the central army group against Russia, but resigned when Hitler ordered the winter attack on Moscow, 1941. He was arrested after the July plot (*q.v.*), 1944, but soon released. He retired to Bavaria where he and his wife were killed in an air raid May 3, 1945.

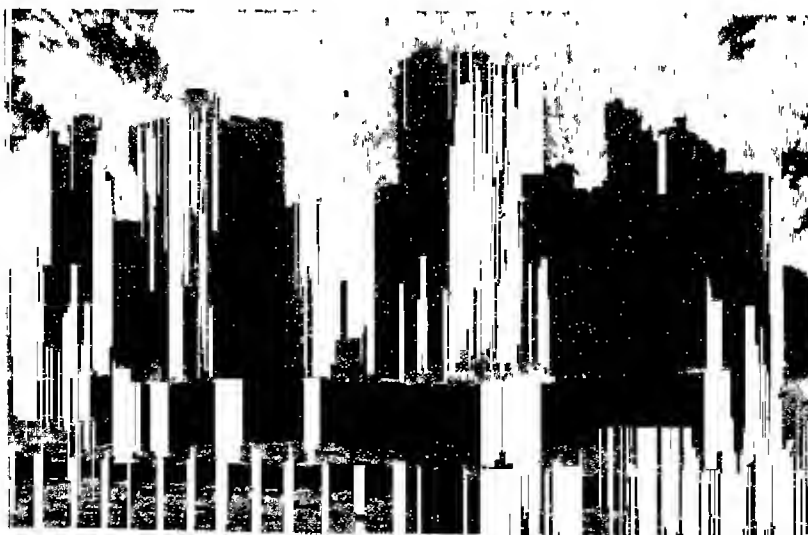
Bockhampton, HIGHER. Hamlet of Dorset, England, 2½ m. N.E. of Dorchester, in the parish of Stinsford. The cottage here in which Thomas Hardy was born was bought by the National Trust, 1947. Stinsford is the Mellstock of Thomas Hardy's novels.

Bocland OR **BOOK-LAND.** Name given in Anglo-Saxon times to land in England granted by the king on conditions laid down in a charter or book. It was usually granted to bishops or monasteries, and only rarely to laymen, and the charters were signed by the king and members of the Witenagemot. At one time it was believed that bocland was the

opposite of folkland, all land being either the one or the other; but the modern theory, put forward in 1893 by Prof. Vinogradoff, is that the same piece of land could be both. The king could grant a piece of folkland, which remained subject to the old customs of the folk, while subject also to the newer conditions laid down in the grant or book. *Consult* Domesday Book and Beyond, F. W. Maitland, 1897; Anglo-Saxon England (Oxford History of England), F. M. Stenton, 1943.

Bocskey, ISTVAN OR STEPHEN (1557-1606). Prince of Transylvania. He belonged to an old Hungarian family, and rose to importance when the Bathory family was ruling Transylvania. He passed some years in exile, being received by the emperor Rudolph II at Vienna, but returned to Hungary to head the resistance against Austrian military oppression, and in 1604 was chosen prince by the Hungarians, to whom only Transylvania was now left. Rudolph II and the sultan Ahmed I, who between them held the rest of Hungary, recognized him as ruler of an independent and enlarged Transylvania. He reestablished the lost privileges of the Hungarian nobility and enacted toleration for Protestants. He died Dec. 29, 1606, there being, probably, truth in the suspicion of his having been poisoned by his chancellor.

Bode, JOHANN ELERT (1747-1826). German astronomer. Born Jan. 19, 1747, at Hamburg, he became astronomer to the Academy of Science, Berlin, in 1772, director of the observatory, 1786, and founded and for many years edited the Berlin astronomical year book. He took an active part in planetary research, and his works on astronomy, especially his guide to the knowledge of the starry heavens, 1768, and Uranographia, 1801, had a large circulation. His name is preserved by Bode's Law (*q.v.*). He died at Berlin, Nov. 23, 1826.



Bodiam Castle. Remains of a moated fortress in Sussex, considered one of the finest in England
Frith

Bodenstedt, FRIEDRICH MARTIN VON (1819-92). German poet. Born at Peine, Hanover, April 22, 1819, he was educated at the universities of Göttingen, Munich, and Berlin. In 1841 he went to Moscow as tutor to the sons of Prince Galitzin. Later he became tutor at the gymnasium of Tiflis (Tbilisi) and took lessons in Tartar and Persian.

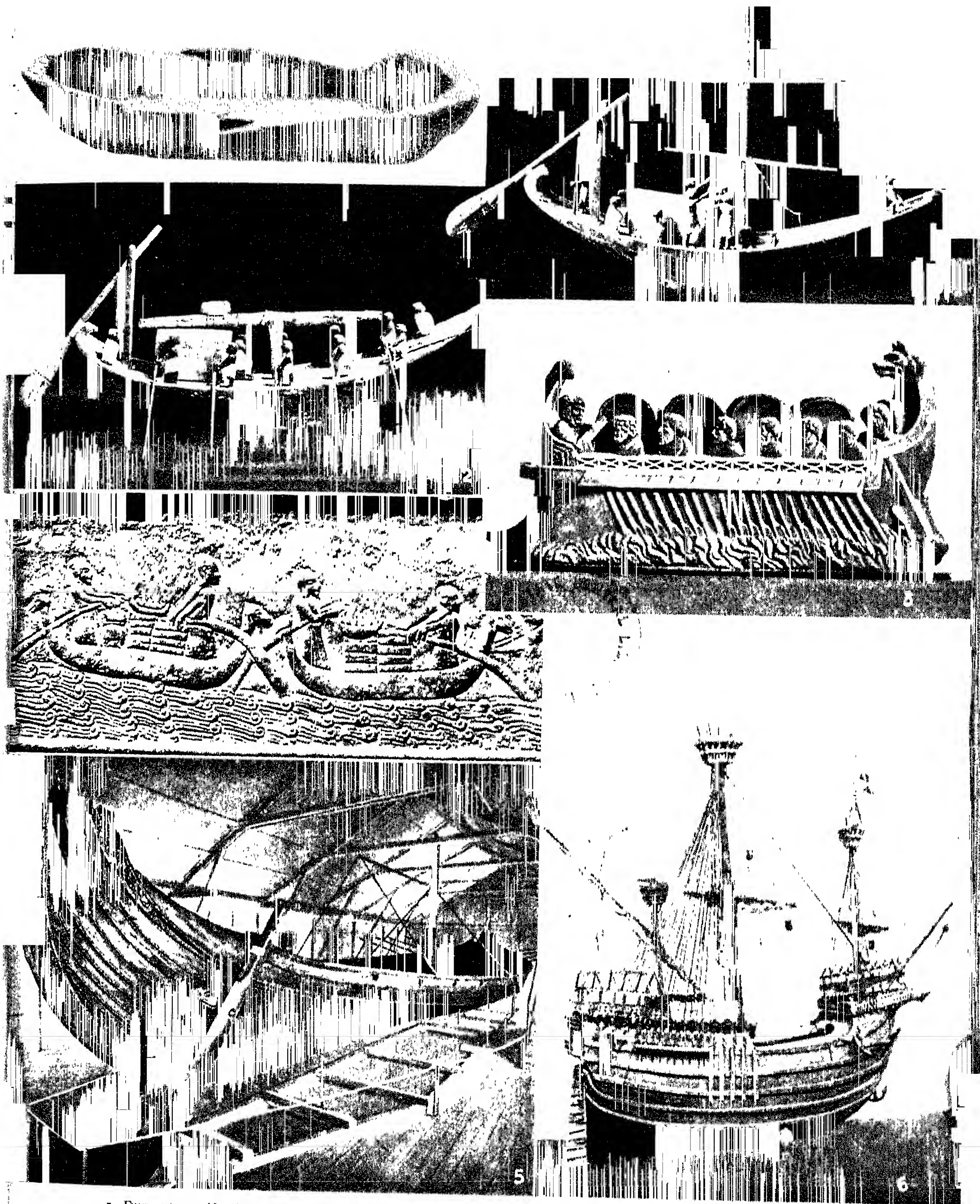
After travelling in the Crimea, Turkey, Greece, and Asia Minor, he returned to Germany in 1847, publishing in 1848 *The Peoples of the Caucasus* and in 1851 *the Songs of Mirza Schaffy*. In 1854 he was appointed professor of Slavonic languages at Munich, and subsequently professor of Old English. He visited England in 1859 and America in 1879, and died at Wiesbaden, April 19, 1892. His works include translations of Omar Khayyam, Pushkin, Koslov, and Lermontov; and he collaborated in a complete translation of Shakespeare's plays.

Boderg, LOUGH. Irregular expansion of the Shannon river, Eire, forming part of the boundary of cos. Roscommon and Leitrim. Its extreme length is about 11 m.

Bode's Law. A sequence of numbers giving approximately the proportional distances of the planets from the sun. The name is derived from J. E. Bode. To obtain the sequence, first write down the numbers 0, 3, 6, 12, (24), 48, 96, 192, 384, 768, and add 4 to each. The ensuing result, 4, 7, 10, 16, (28), 52, 100, 196, 388, 772, is the sequence, and these numbers are approximately proportional to the solar distances of the planets Mercury, Venus, Earth, Mars, (asteroids), Jupiter, Saturn, Uranus, Neptune, and Pluto.

Bode ascribed the number 28 to an unknown planet, the assumed position of which corresponded fairly closely to the mean position of the asteroids, which were discovered subsequently. The agreement with fact is tolerably good for the inner planets (but Saturn should be 95), but the number for Neptune is about 300 instead of 388, and for Pluto 390 instead of 772.

Bodiam Castle. Ruin in Sussex, formerly one of the finest moated fortresses in England. It is on the left bank of the Rother, near Robertsbridge. The remains consist of four round towers, one at each corner of the walls, a fine gateway, a portecullis, parts of the hall, chapel, and kitchen, and the moat. It was presented to the nation by the marquess of Curzon, 1925.

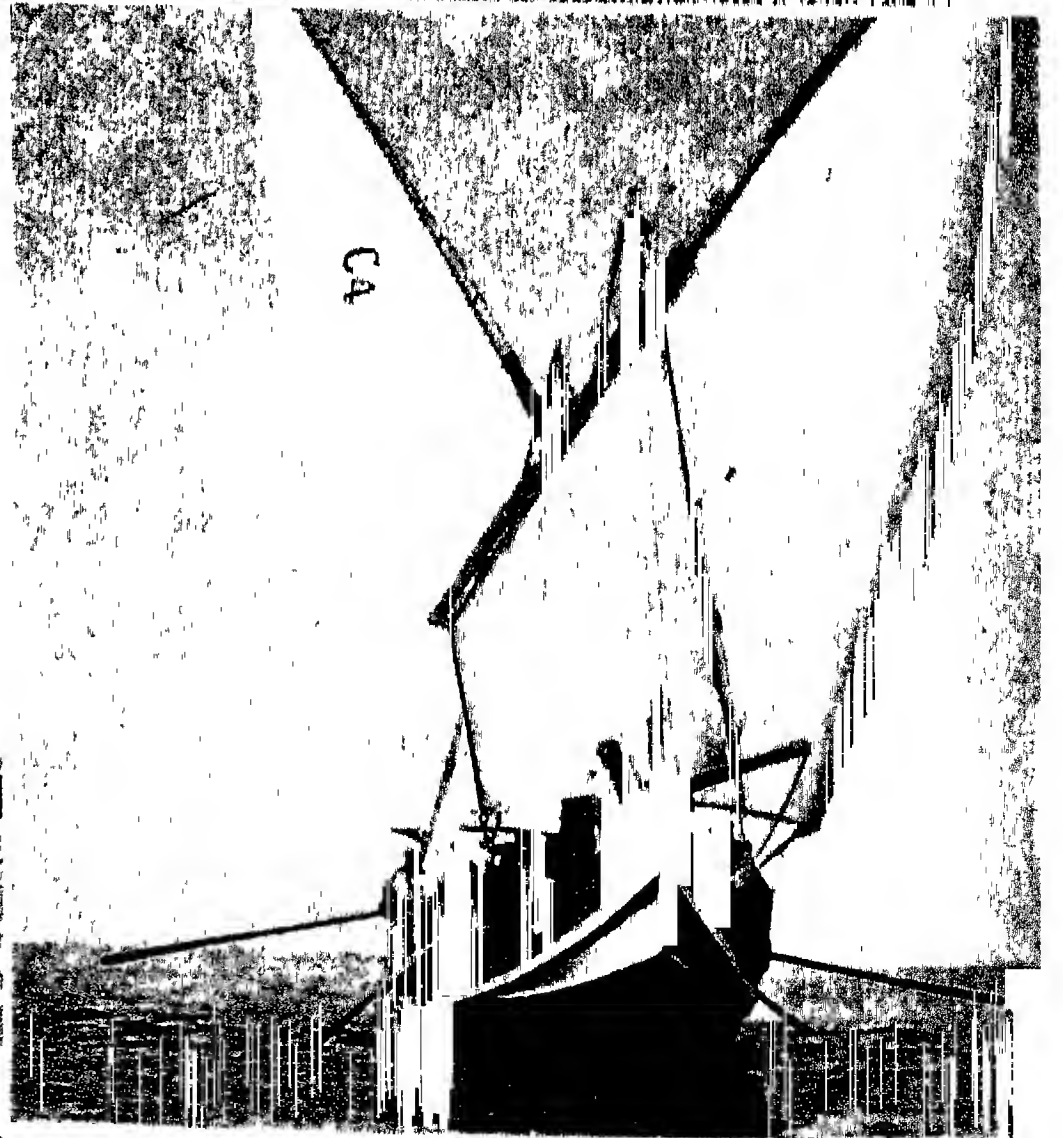
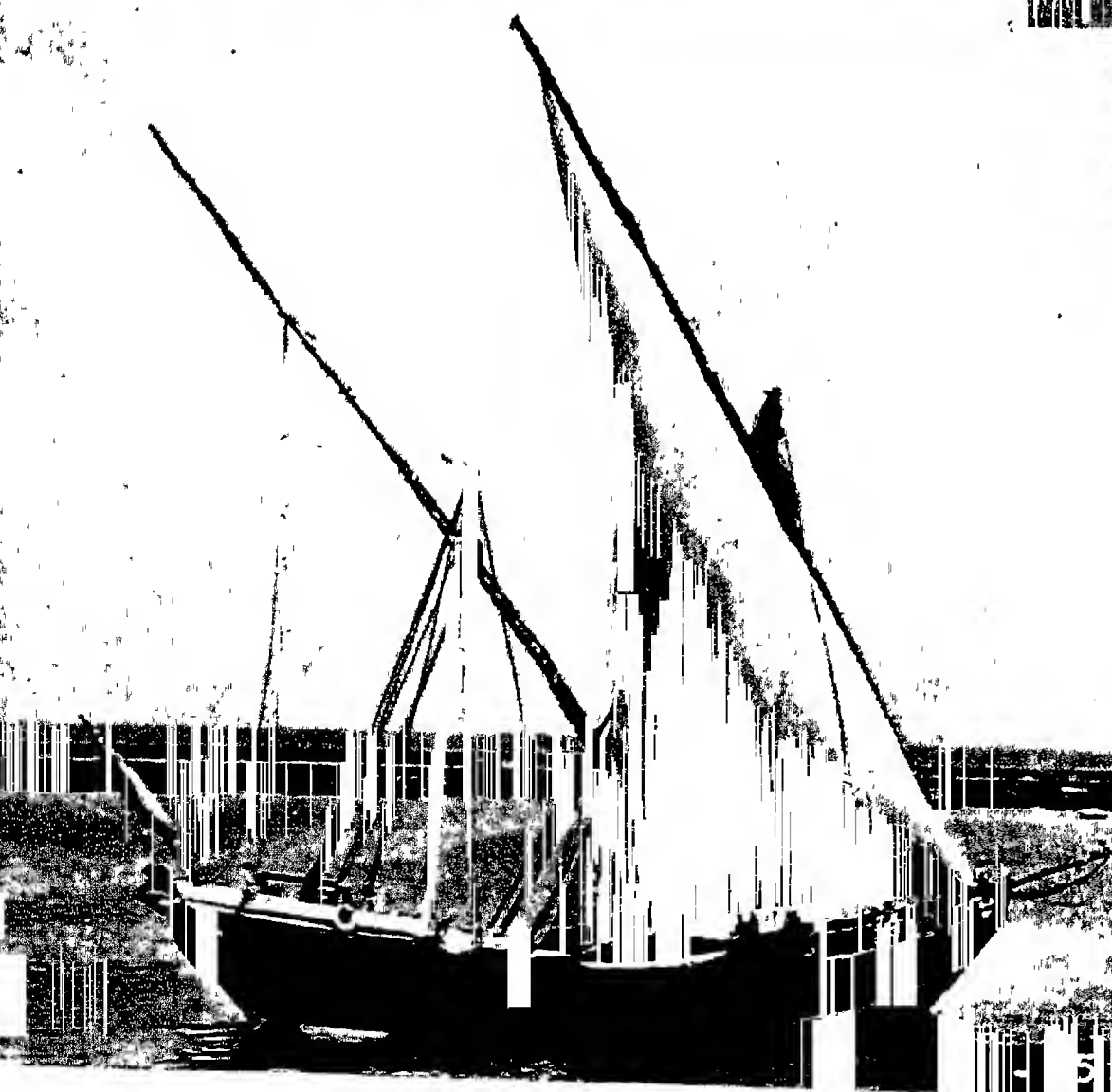
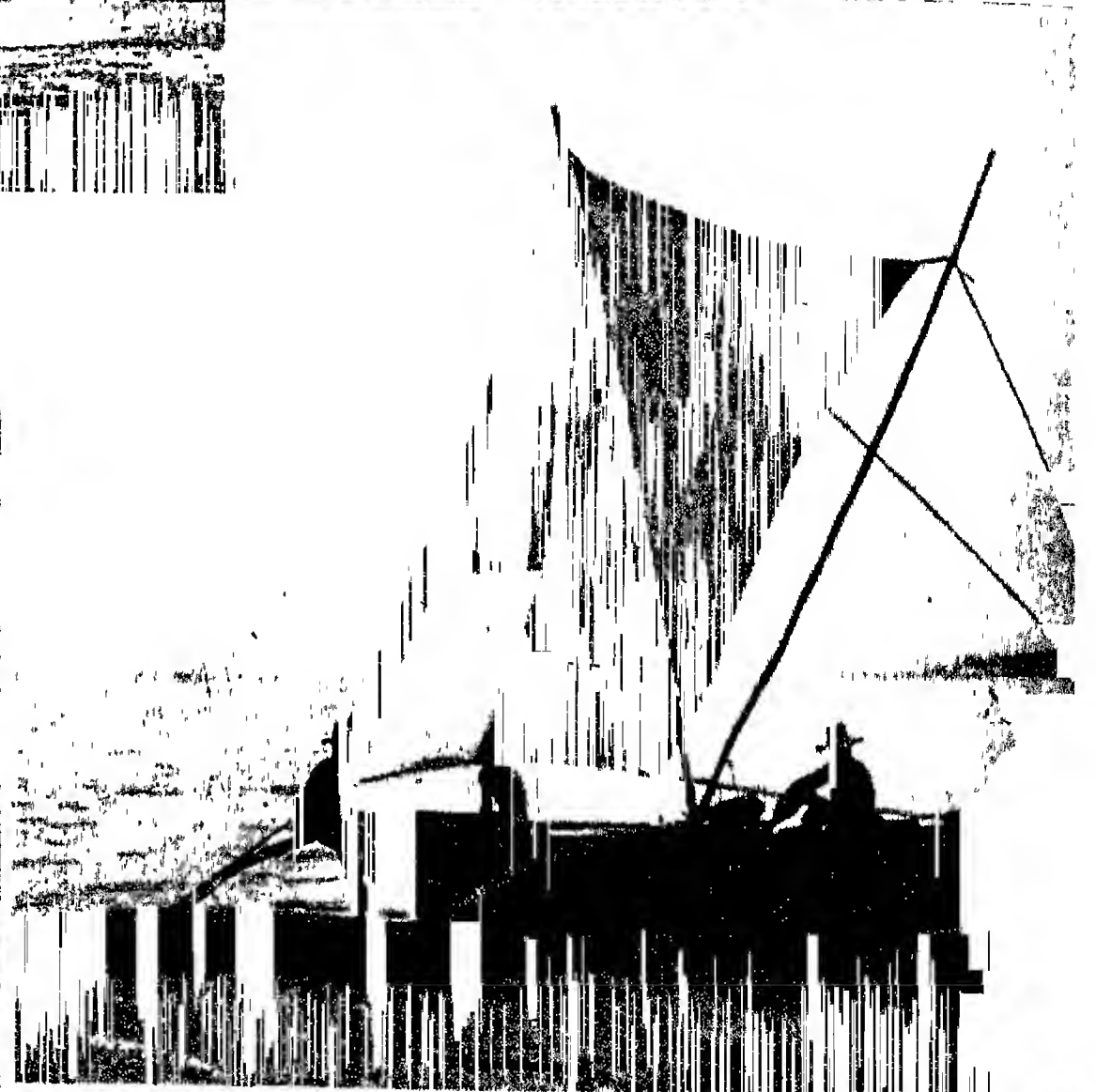
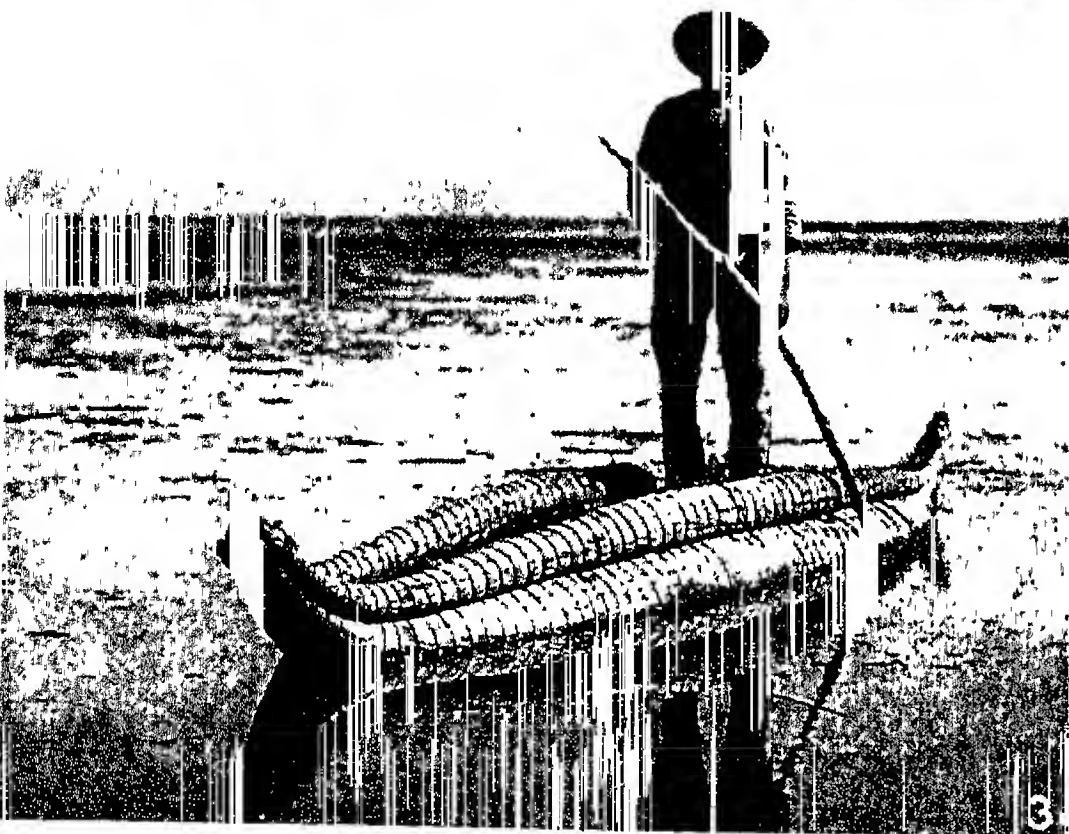
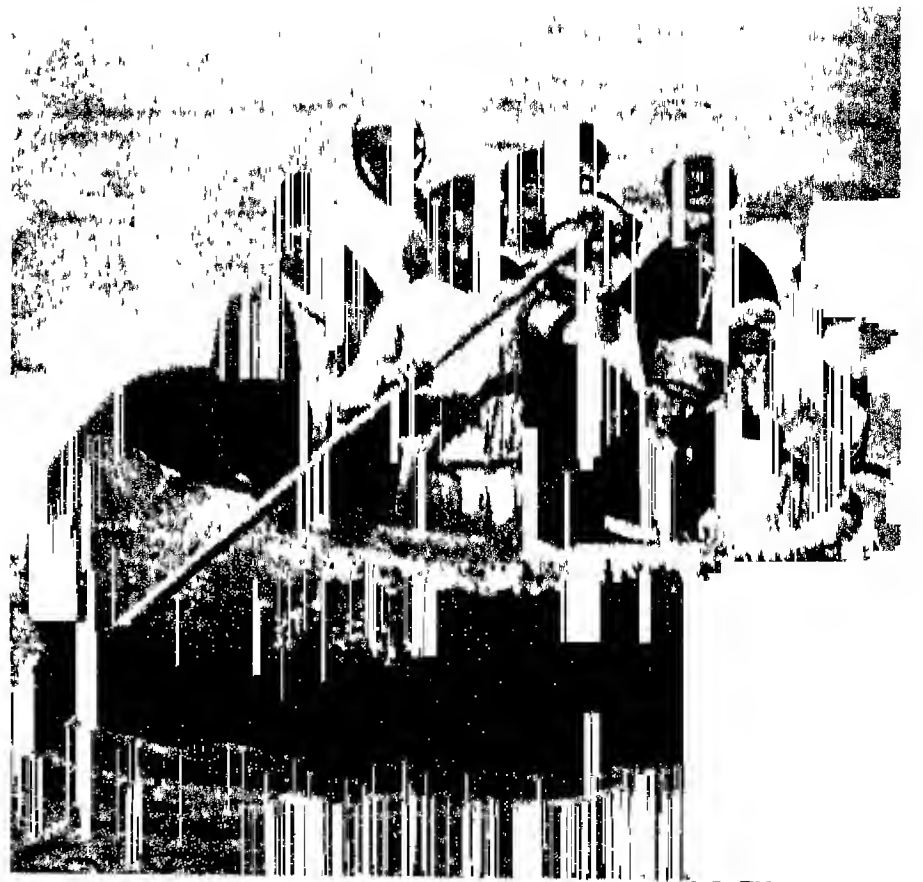
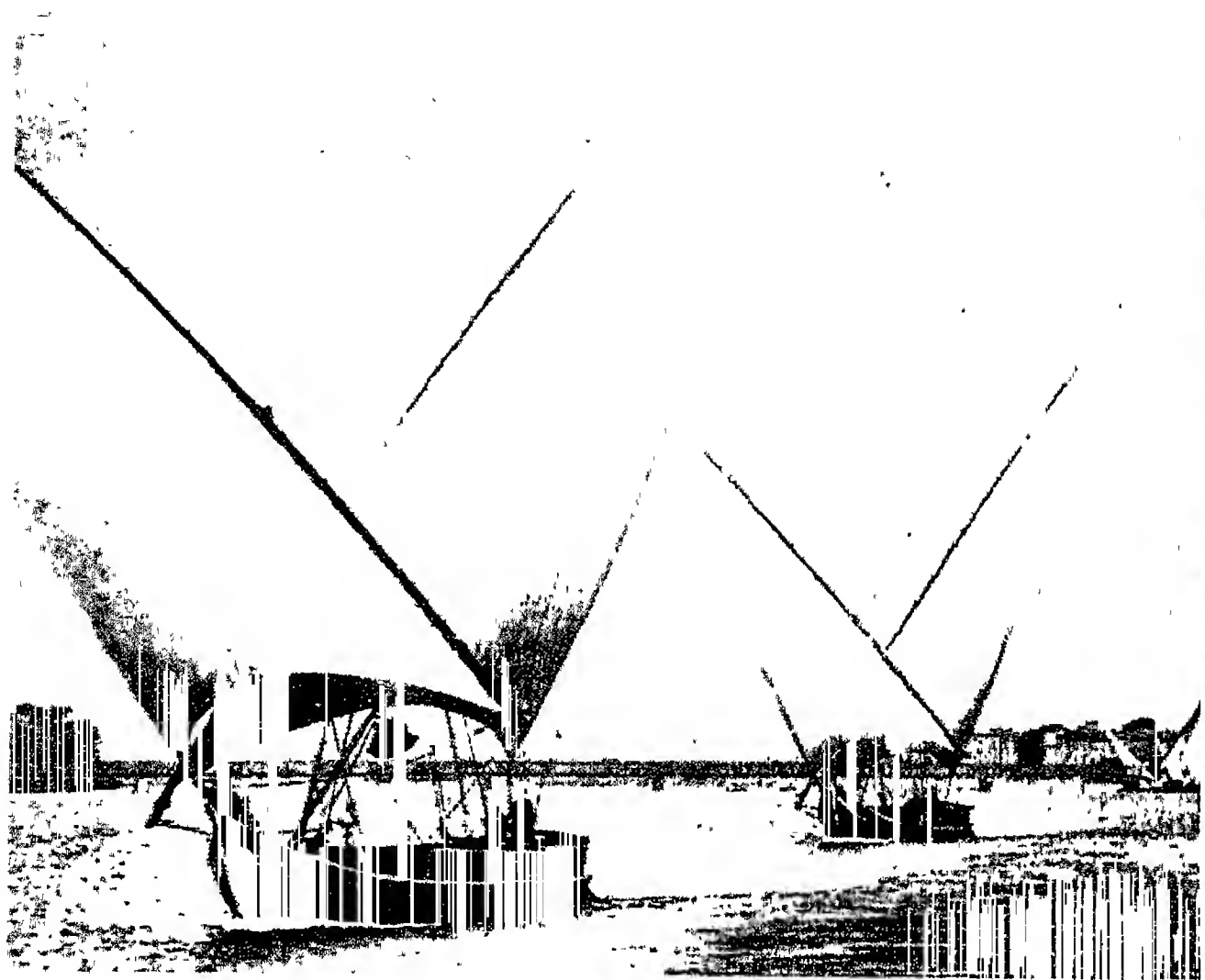


1. Dug-out: a Neolithic example found near Ryton-on-Tyne. 2. Model boats of the Nile, complete with sailors and look-out, from a XII dynasty Egyptian tomb. 3. Roman sculpture of a barge with a cargo of wine barrels. 4. Tyrian boats of the 9th century B.C. 5. Viking boat,

mid-9th century, located at Oseberg, Norway. 6. Rigged model of a 15th century Flemish carrack made by R. Morton Vance. The vertical skids on the side protected the boat when alongside wharves during loading and unloading. A square sail was carried on the foremast.

BOAT: HISTORICAL DEVELOPMENT FROM NEOLITHIC TIMES. See text, pp. 1237-39.

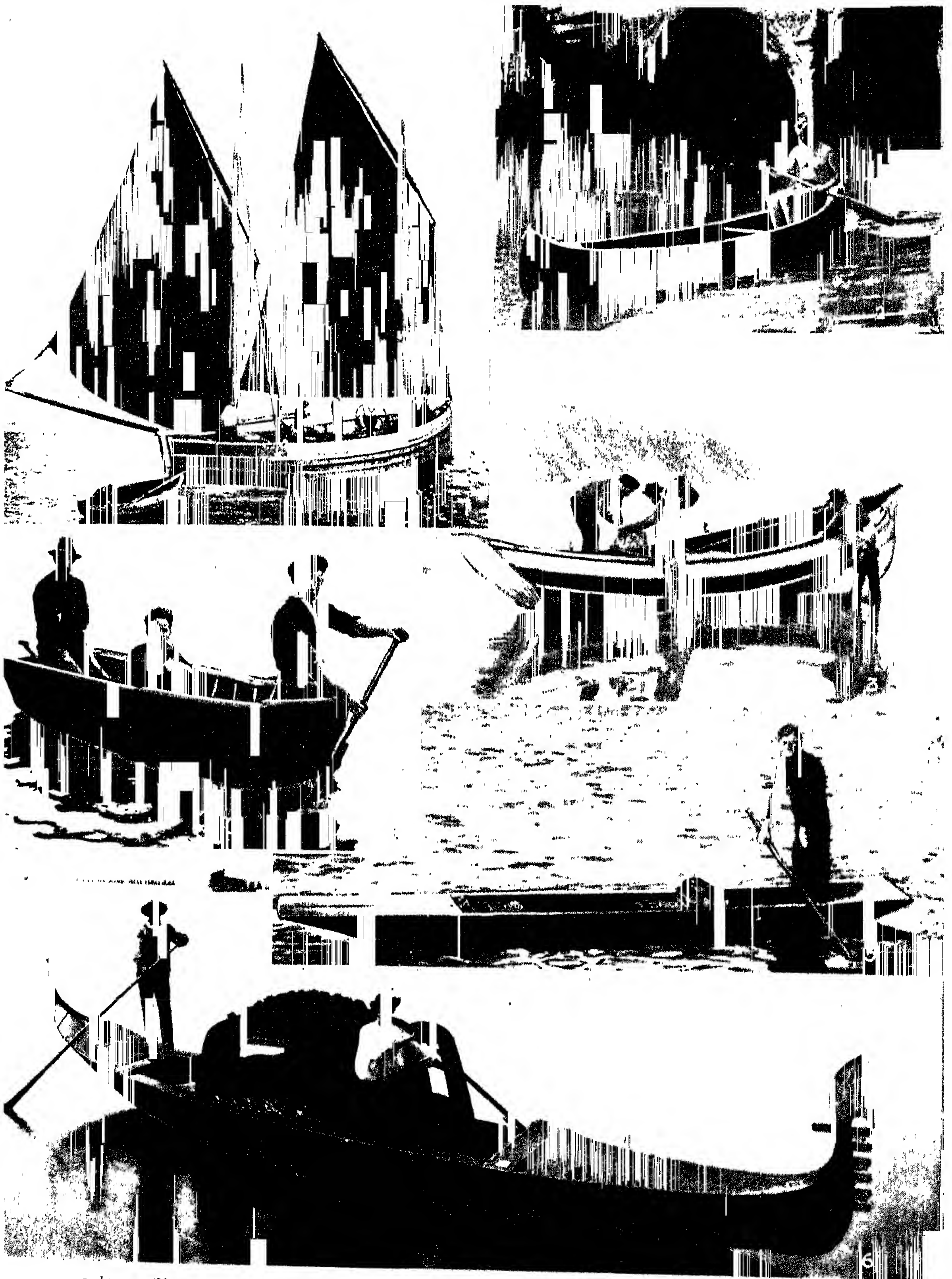
Photos. 2, from Sir Flinders Petrie's "Gizeh and Rifeh"; 3, Trèves Museum; 4, British Museum; 5, Courtesy of Oslo University; 6, The Science Museum, South Kensington.



1. Feluccas, trading boats of the R. Nile, with characteristic double sails. 2. Arabs navigating a goofah, as used on the rivers of Iraq. 3. Balsa, entirely constructed of woven reeds, used by the natives of Bolivia. 4. Catamaran which carries steadying floats and is used for fishing off

the coast of Ceylon. 5. Arab dhow, a trading boat in the Arabian Sea. 6. Gozo (named after Malta's daughter islet), which from a distance closely resembles a felucca, but carries a double topsail; it is generally seen off Maltese islands in the Mediterranean

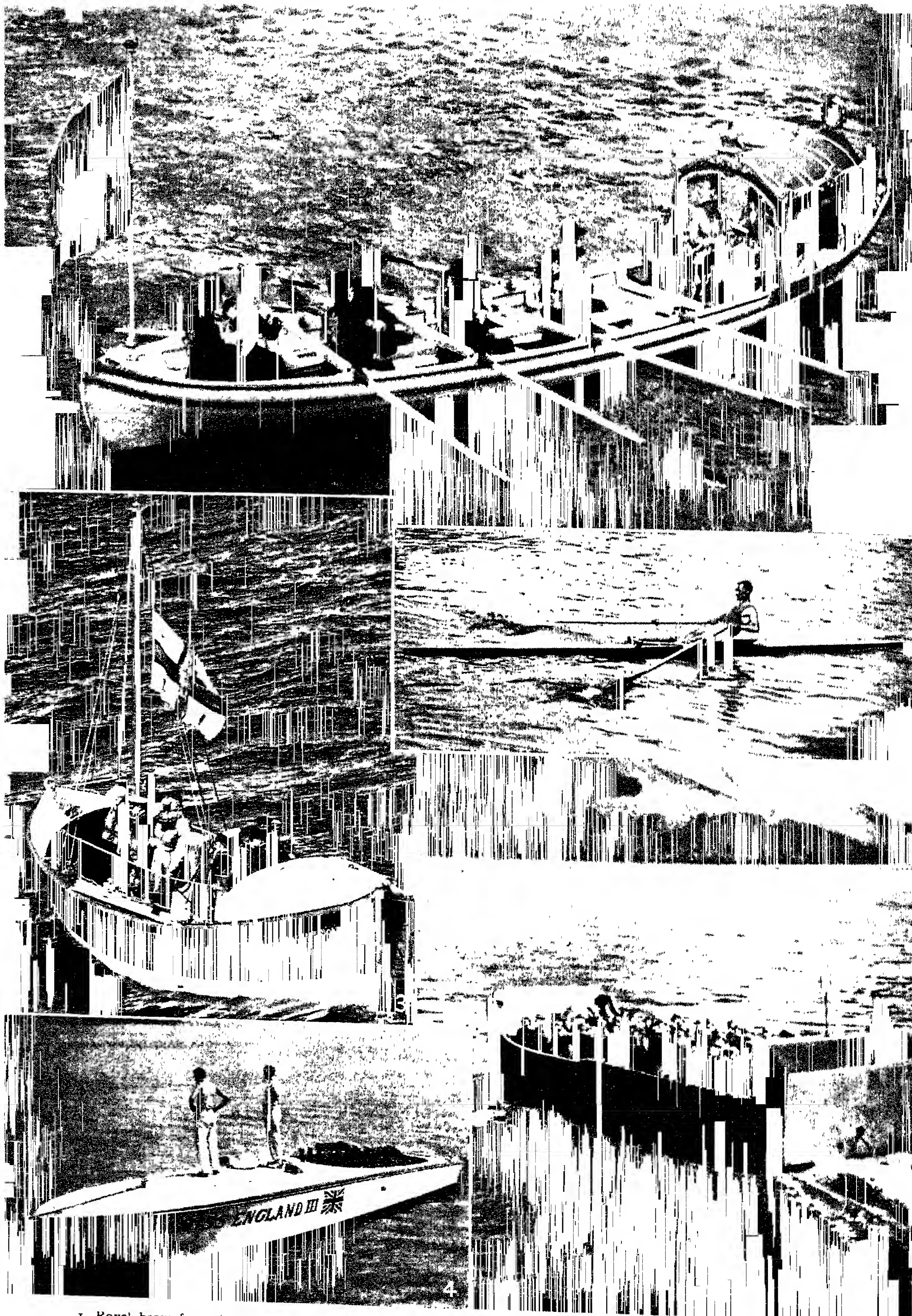
BOAT: NATIVE CRAFT OF VARIOUS PARTS OF THE WORLD



1. Lugger (Mount's Bay, Cornwall), with characteristic pointed stern. 2. Canoe as designed by American Indians for hunting expeditions, but mainly used for pleasure in European countries. 3. Yorkshire coble, the chief feature of which is a high, powerful, and deep bow with a shallow

keelless stern. 4. Irish currie, a steady craft used by fishermen. 5. Punt, a shallow draft boat, propelled by long pole. 6. Venetian gondola with ornamented cabin, bow, and stern, propelled by oarsmen, characteristic form of passenger transport on the canals of Venice

BOAT: SPECIAL TYPES DEVELOPED IN DIFFERENT REGIONS



1. Royal barge formerly used on the R. Thames for state pageants: it has a richly decorated cabin surmounted by royal insignia and is propelled by eight oarsmen. 2. Racing skiff, with sliding seat: it can be easily carried by the sculler. 3. Type of motor-propelled lifeboat. 4. Lord

Wakefield's streamlined motor boat, Miss England III, used for speed tests. 5. Troop-carrying motor landing craft of the type widely used in the Second Great War: it has an armour plated hull and a drop bow for disembarkation and is powered by a Diesel engine

BOAT: FURTHER SPECIALISED TYPES, FROM ROYAL BARGE TO L.C.I.

Photo No. 5, British Official, Crown Copyright

Bodin, JEAN (1530-96). French economist, historian, and philosopher. Born at Angers, and trained at Toulouse, he settled in Paris as an advocate, and held a post under the crown. In 1581 he visited England as secretary to the duke of Alençon. His later life was spent at Laon, where he died of plague. Bodin founded the philosophy of history in France. In his work, *De la République*, 1576 (Eng. trans. *Of the Republic*, 1606), he set forth his ideal of a state and defends the principle of authority. He prefers a monarchy, but safeguarded against despotism by laws, natural and divine.

Bodinnick. Village of Cornwall, England. Opposite Fowey on the estuary of the Fowey, it is connected therewith by a ferry, well known to motorists visiting the Cornish Riviera.

Bodkin. Instrument originally used by Greek and Roman women for keeping up the hair. Resembling



Bodkin. Printer's bodkin and bodkin used in needlework connect it with the Welsh *bidog*, which has the same meaning.

Bodleian Library. Library of the university of Oxford. It was named after Sir Thomas Bodley (*q.v.*) who refurnished and equipped the 15th century building of the old university library known as Duke Humphrey's library (after the founder, Humphrey, duke of Gloucester). Bodley's library was opened in 1602, and is one of the oldest public libraries in Europe, and among English libraries is second in size only to that of the British Museum. It has about 1,750,000 vols. Notable donors of printed books and MSS. were, besides Bodley, Archbishop Laud, Sir Kenelm Digby, John Selden, Thomas Tanner, Bishop of St. Asaph, Richard Rawlinson, and Francis Douce.

During the 19th cent. the library took over the adjoining Old Schools quadrangle, and the Radcliffe Camera. A new building near by, designed by Sir Giles Gilbert Scott, built 1936-39, opened 1946, contains the main bookstacks and is connected by a tunnel under Broad Street with the old library. Three dependent libraries, the

Radcliffe science library, Rhodes House library, and the Indian institute library, are under the administrative control of Bodley's librarian.

The Bodleian Library is entitled to receive free of charge a copy of every book (which includes newspapers, pamphlets, sheets of music, etc.), published in the U.K. if it demands one within a year of publication. *Consult* History, 1845-1945, Sir Edmund Craster (former Bodley's librarian), 1952.

Bodley, GEORGE FREDERICK (1827-1907). British architect, consulting architect for Liverpool cathedral. Born at Hull, March 14, 1827, he became a pupil of (Sir) Gilbert Scott in 1845. He was the architect of many new Gothic churches, notably at Eccleston, Hoar Cross, and Kensington (Holy Trinity), and did much restoration at Oxford, *e.g.* at Magdalen and University colleges. He was elected A.R.A. in 1882, R.A. in 1899, and was an assessor in the competition for the design of Liverpool cathedral. He was working on plans for the cathedral at Washington, D.C., when he died, Oct. 21, 1907.

Bodley, SIR THOMAS (1545-1613). English scholar and diplomat. Born at Exeter, March 2, 1545, he was educated at Geneva and Magdalen College, Oxford, and became fellow of Merton, Greek lecturer, and deputy public orator. He travelled in Italy, France, and Germany (1576-80); was gentleman usher to Queen Elizabeth I, who employed him as envoy to Denmark, France, and the United Provinces (1585-96); and devoted the rest of his

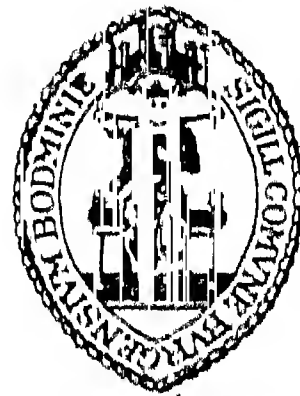


Sir Thomas Bodley,
English scholar
Bodleian Library

life to restoring the library of Duke Humphrey at Oxford subsequently named after him. He was knighted in 1604, and died Jan. 28, 1613.

Bodmer, JOHANN JAKOB (1698-1783). German-Swiss poet and critic. Born at Greifensee, near Zürich, he was professor of Helvetic history in the university of Zürich for 50 years (1725-75). His great aim was to free German poetry from the restrictive influences of French classicism. In 1721 he published with J. J. Breitinger a weekly review, *Die Diskurse der Maler*, in which the poets of the day were severely handled. In 1732 he brought out a translation of Milton's *Paradise Lost*. He died at Zürich, Jan. 2, 1783.

Bodmin. Borough, market town and co. town of Cornwall, England. It is on the river Camel, 30 m.



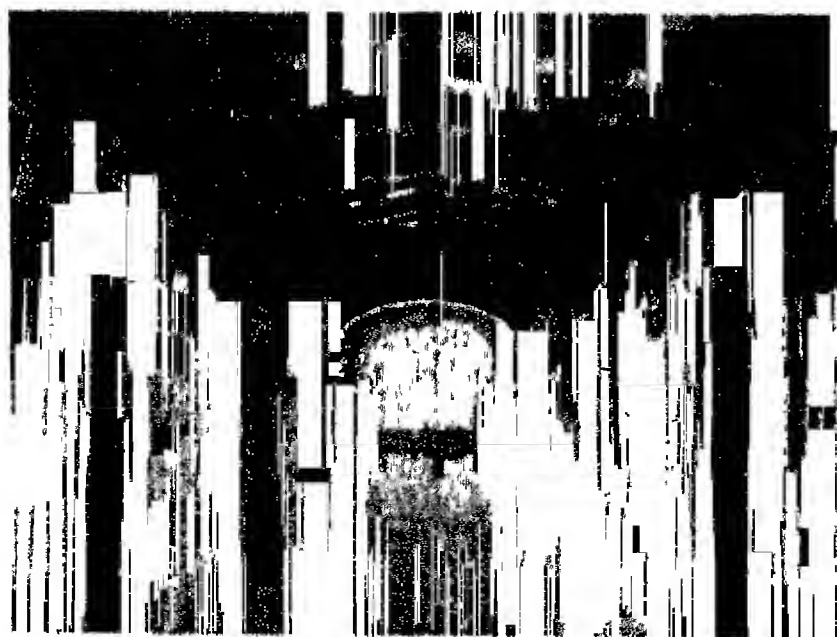
Bodmin arms

W.N.W. of Plymouth by railway. It has the 15th century church of S. Petroc and an Elizabethan grammar school. It has a market on Sat. and an annual fair about Oct. 30. Bodmin is the centre of a large agricultural district. It gives its name to a co. constituency. Pop. (1951) 6,058.

Bodo. Language group of the Tibeto-Burman sub-family, in E. Bengal and Assam. Spoken by some 680,000 people, it has adopted Indo-Aryan inflexions. Bodo-speaking peoples are valley-dwellers, *e.g.* the Mongoloid, semi-civilized Kacharis of the plains, or isolated hill-tribes like the Damasas, Garos, and Tipperas. *See* Garo.

Bodø. Seaport of Norway, in the co. of Nordland, with rock-bound harbour. It stands on Salten Fjord, and exports eider-down and fish. Pop. 4,900.

Body. Material structure of man as distinct from his spiritual nature. In more limited sense, the main part or trunk of a man, animal, or inanimate thing as distinguished from its limbs or accessory parts. The word is also applied to an organized group of persons, such as the body politic; to the sun, moon, and stars; to the chief part of a document; and to the qualities of fluid, as a wine of body. *See* Anatomy; Man.



Bodleian Library. A vista in one of the galleries of the great Oxford treasure house of learning

Body. In engineering, that portion of a vehicle above the under-frame or chassis within or upon which the load is placed; or the main or principal part, as of a valve or cylinder, to which other parts are attached. See Motor Car.

Body Colour. In art, water-colour made opaque by the addition of Chinese white. It is thus opposed to the proper use of water-colour as a transparent wash, but is employed to add strength and brilliance. Another form of body colour is *gouache*, a comparatively rare method of painting in colour mixed with gum arabic and honey. See Water Colour Painting.

Body-Line Bowling. In cricket, a method of bowling alleged by its opponents to be equivalent to intimidation. Very fast balls, aimed not at the wicket but at the line of the batsman's body, might cause him, in protecting himself, to play so as to offer catches to fieldsmen close on the leg-side. Although the method was not new, controversy as to its ethics, starting in Australia, 1932-33, came to a height in 1934 and centred round the Nottinghamshire and England bowlers Larwood and Voce in international matches and county matches alike.

Body's Island OR **BODIE ISLAND.** Narrow sandy island off the coast of N. Carolina, U.S.A. Its S. end is at Oregon Inlet; 2 m. N. stands one of the highest lighthouses in the U.S.A. Naghead, the seaside resort, is on Body's Island.

Bodysnatching. Term given to the secret disinterment of corpses subsequently sold for dissection. In Great Britain before 1832 only the bodies of murderers were allowed to be dissected, and with the progress in the study of anatomy the supply of bodies became insufficient. Corpses were stolen by the so-called bodysnatchers or resurrection men, and had to be interred in iron coffins, or their graves protected by iron cages known as mortsafes.

The scandal reached a climax when William Burke and William Hare made a practice of drugging and suffocating persons in order to sell their bodies. By the Anatomy Act, 1832, the supply of bodies for dissection was legalised and adjusted and a system of licensing and supervision established. Isolated instances have sometimes occurred of bodysnatching as a means of extorting money from relatives, especially in the case of rich Americans. R. L. Stevenson has a story on the practice, *The Body Snatcher*, 1885;

James Bridie's play *The Anatomist* treats of it; and it figures in Dickens's *A Tale of Two Cities* and Mark Twain's *Tom Sawyer*.

Boece OR **BOYIS, HECTOR** (c. 1465-1536). A Scottish historian. Born at Dundee, he was educated in the university of Paris, where he was appointed professor of philosophy in 1497. About the beginning of the 16th century he became president of the newly founded university of Aberdeen. In 1522 he published in Paris his Latin *Lives of the Bishops of Mortlach and Aberdeen*, and in 1527 his *History of Scotland* to the accession of James III. A Scottish translation of the *History*, written c. 1533 by J. Bellenden, was printed in 1536; Eng. trans. William Harrison, 1577.

Boeckh, PHILIPP AUGUST (1785-1867). A German classical scholar. Born at Karlsruhe, after studying at Halle and Berlin he became professor of philology at Heidelberg, and in 1811 at Berlin, where he remained until his death.

Boeckh treated ancient civilization as a whole from an historical standpoint, instead of limiting himself to textual criticism. In his *Public Economy of Athens*, 1817, Eng. trans. G. C. Lewis, 1828, he laid great stress on the results to be obtained from inscriptions and, by inducing the Berlin Academy to publish a *Corpus of Greek Inscriptions*, 1828-43, laid the foundation of modern epigraphy. Similarly, his edition of Pindar, 1811-21, paved the way for the scientific study of metre and rhythm. Boeckh also wrote on chronology, coins, and weights.

Boecklin, ARNOLD (1827-1901). Swiss painter. Born at Basel, Oct. 16, 1827, Boecklin studied at Düsseldorf under Schirmer. After visiting Brussels, Paris, where he was present during the Revolution of 1848, Rome, and Munich, he obtained a post at the Weimar Academy (1860-3). Thirty years of prosperous though restless activity followed before, in 1892, he settled in his own house at Fiesole, where he died, Jan. 16, 1901.

In Boecklin's pictures, landscape in its every mood is the paramount consideration. His finest work shows a sure instinct for the decorative value of masses.

Boehm, SIR JOSEPH EDGAR (1834-90). British sculptor. Born at Vienna, of Hungarian parentage, on July 6, 1834, he settled in London 1862, and was naturalised in 1865, elected A.R.A. in 1878, and R.A. in 1880. His work in-



Sir Joseph Boehm,
British sculptor
Elliott & Fry

cludes statues of Lord Beaconsfield and Dean Stanley in Westminster Abbey, Carlyle on the Thames Embankment, Darwin in the Natural History Museum, and the Wellington Monument at Hyde Park Corner. Made a baronet in 1889, he died Dec. 12, 1890.

Boehme, JAKOB (1575-1624). German mystic, best known to English readers as Jacob Behmen. Born of poor parents, probably Bohemian, at Altseidenberg, near Görlitz, Lusatia, he set up as a shoemaker. From boyhood he was much given to meditation and reading of the Bible and the works of the alchemists, the fruits of which were seen in *Aurora* (1612), which created a sensation by its teaching on the unity of life and man's close relation to the divine.

Vaguely anticipating Schelling, Boehme taught that God was the rational ground and efficient cause of the universe, which was simply "the essential nature of God Himself made creatural"—a kind of pantheism. The universe, including man as the microcosm, exists as an opposition of good and evil; hence this opposition must be sought in the deity as the primal cause of all things.

So Boehme develops the theory of an eternal self-generation of God, and maintains that from the ground of being within Himself the Divine will or impulse finds expression in the Divine wisdom; and this self-revelation forms itself into the universe. Three kingdoms of the universe are thus formed, which ascend from the opposition of the material forces of attraction and repulsion to those of light and warmth, and then to those of sense and intellect.

Such speculations naturally aroused the hostility of the clergy, and Boehme was forbidden to publish any more books. In 1618, however, he resumed his teaching, but published little before his death on Nov. 17, 1624. His writings, which were rapidly translated into English, were in con-



Jakob Boehme,
German mystic
From an engraving of 1820

siderable repute in Great Britain in the 17th century, and William Law was greatly indebted to him. *See* Law, William; Mysticism.

Boeing. American aircraft manufacturers, with main works at Seattle. Boeing bombers were the outstanding heavy equipment of the U.S.A.A.F. in the Second Great War, the B-17 or Flying Fortress (*q.v.*) over Europe and the B-29 or Superfortress (*q.v.*) in the attacks on Japan. Later the B-29 was improved as the B-50, and the commercial Stratocruiser appeared on the air-lines in 1949.

Boendale, JAN, OR DE KLERK (c. 1280–1365). Brabant poet. Born at Tervueren, he went to Antwerp, where he became town clerk (1310), and later (1330) clerk to the sheriffs. He and Maerlant were the great medieval writers of Dietsch or early Dutch. Boendale was the author of the first five books of a rhyming chronicle of the history of Brabant, written 1316–47.

Boeotia. District of ancient Greece named after Boeotus, son of Stonus. Bounded on the E. by the Euripus, on the N. and W. by Locris and Phocis, and on the S. by Attica, Megaris, and the Corinthian Gulf, and almost completely surrounded by mountains, it contained several fertile plains and one considerable lake, Copias. Mt. Helicon was favoured by the Muses. Area, c. 1,000 sq. m.

The atmosphere was damp and oppressive, and to climatic conditions was attributed the proverbial dullness of the inhabitants. Yet Boeotia produced some great men: Pindar, Epaminondas, Pelopidas.

Of the original inhabitants the Minyae alone remained unabsorbed by the Aeolian immigrants. The most important town of Boeotia was Thebes, founded according to legend by Cadmus. All the cities were united in a league, which from 371 B.C. was completely dominated by Thebes. Boeotia with Attica forms a modern dept. of Greece, with a pop. of 1,144,330. *See* Greece: History.

Boers. The early Dutch colonists—and their descendants—in South Africa. The Dutch word, pronounced like its English form boor, meaning originally a tiller of the soil, came to mean farmer. The stranding in Table Bay of a Dutch East India Company ship in 1648 led to the establishment in 1652 of a fortified garden. In 1657 some discharged seamen and soldiery, supposed to have been returning from Java, formed a settlement of free burghers, which was gradually extended and rein-

forced by a contingent of Amsterdam orphan girls. A small Huguenot party left permanent traces on the Boer temperament. With the occupation of the colony by Great Britain in 1795, its modern political vicissitudes began.

For two centuries the Boers spread N. by trekking. This brought them into contact with the aboriginal peoples—N.W. with Bushmen and Hottentots, N. with Bantu negroids of Bechuana and Basuto stock, N.E. with Zulu-Kaffirs. These peoples were partly repressed and partly compelled to assist in cattle-rearing and agriculture, an incidental result being the so-called Cape coloureds of mixed black and white origin. The Boer colonists remained faithful to the material culture, Roman law, mental outlook, and religious temperament of the 17th century Dutch republic. Their intercourse with the aboriginal peoples and their uniform physical environment produced a simplified vocabulary, protected from disintegration by the stately version of the Bible which they carried with them. This Cape Dutch (Afrikaans) has contributed words, *e.g.* veld, inspan, to current English.

Boer War. Name frequently given to the war of 1899–1902, between the British and the Boers. *See* South African War.

Boetius OR BOETIUS (480–524). A Roman philosopher and statesman. Born at Rome, and belonging to a distinguished Roman family, he married Rusticiana, daughter of Symmachus, and became consul in 510. He had already won the favour of Theodoric the Great, whose court was then established at Rome, and by him had been made head of the civil administration. His integrity during his term of office prevented the spoliation of the Italians, but raised enemies. Accused of supporting the senate against Theodoric, he was deprived of all his offices, imprisoned at Padua, and finally executed.

The most important of his works, *De Consolatione Philosophiae*, in five books, written from a theistic standpoint, was produced in captivity, and on the strength of it Boetius ranked high as a philosopher until the end of the Middle Ages. King Alfred and Chaucer translated parts of the *De Consolatione*, and many later translations have been made.

Boettger OR BOETTCHER, JOHANN FRIEDRICH (1682–1719). German porcelain manufacturer. Born in Reuss-Schleiz, he laboured

for some years as an alchemist in Saxony, supported by the court at Dresden, in vain search of the philosopher's stone. While experimenting on clay he produced the famous Meissen porcelain, and was appointed supervisor of its manufacture in 1708, the strictest secrecy being enjoined as to the processes. He died March 13, 1719.

Boettger Ware. Hard stone-ware resembling jasper, first made by J. F. Boettger at Meissen, Saxony. He discovered how to produce hard porcelain of the true Chinese type. *See* Dresden China.

Bofors Gun. A.A. gun first produced at Bofors works, Sweden, and later adopted by most nations. It weighs two tons, is highly mobile, and fires self-detonating 2-lb. shells to a height of 6,000 ft. The ammunition is clip-fed, but a modified version with a belt or drum feed was fitted to fighter aircraft engaged in anti-tank operations during the N. Africa campaign in 1942. Bofors were also used as mobile anti-tank guns during the campaigns in France and Germany in 1944. *See* illus. Anti-Aircraft Command, p. 491.

Bog (Gaelic, soft). Name for soft, saturated, and spongy land, in which much decaying and decayed vegetable matter is present. Bogs are common in cool, damp, temperate climates. Familiar examples are those in Ireland, where bogs cover about one-eighth of the total area. The central plain of Ireland is composed of carboniferous limestone covered by an almost continuous sheet of boulder clay, the relic of former glaciation, and is dotted with lakes made by the damming of streams by moraines, or by the dissolving of hollows in the limestone, which is often saturated with water.

These shallow, stagnant lakes are gradually filled by vegetable growth, especially sphagnum, a moss that gradually covers the surface of a pond or lake, and fills it with decomposed vegetation, which assumes the appearance of a stiff, fibrous mud. This peat, cut into brick-shaped pieces and stacked until dry, furnishes fuel with about one-half the heating power of coal. Peat also yields a valuable constituent of artificial manure, and machinery for the manufacture of gas has been installed in the Bog of Allen, the largest of the Irish bogs, E. of the Shannon, chiefly in Offaly.

Bogs hinder communication, for all important roads and railways must either avoid them or be built on causeways resting on the solid

rock below, and as bogs are usually from 20 ft. to 50 ft. thick, the construction of these is costly. Nor can the land be used for agriculture until all the bog has been removed and replaced by new soil.

Bogs are not uncommon on damp hillsides, and, being liable to burst after heavy rains, are a serious danger to land in the line of their slide. In England, Solway Moss, at the head of Solway Firth, and Chat Moss, in S. Lancs., have been largely drained and filled up.

Bogan. River of New South Wales, also called New Year river. Rising in the Hervey Mts., after a N.W. course of about 350 m., it enters the Darling near Bourke.

Bog Asphodel (*Narthecium ossifragum*). Perennial marsh herb of the family Liliaceae. It is a native of Europe and N. America. It has a long, creeping rootstock from which the rigid sword-shaped leaves spring. The stem bears a raceme of golden yellow flowers in July. The name *ossifragum*, or bone-breaker, preserves an old belief that sheep that were pastured in marshes contracted the rot through feeding on this plant, common in bogs of the U.K.

Bogbean (*Menyanthes trifoliata*). Perennial marsh herb of the family Gentianaceae. A native of Europe, N. Asia, and N. America, its stout, matted rootstocks run through bogs and marshes, sending up large leaves divided into three oblong leaflets 1 or 1½ ins. long, resembling the leaves of the broad bean. The flowers, which are borne in a spray at the summit of a tall stalk, are funnel-shaped, pinkish without, white within, the five lobes beautifully fringed. The starchy rootstocks have been used for food and owing to its bitter properties the plant has been employed as a tonic and as a substitute for hops in brewing.

Bog Butter. Name given to a peculiar substance of the colour and consistency of butter occurring in masses in Irish peat bogs, known mineralogically as butyrite or butyrellite (Lat. *butyrum*, butter). It was formerly supposed to be of vegetable origin, but the frequent presence in it of animal hairs points to its being a kind of adipocere (*q.v.*).

Bogey, COLONEL. In golf, an imaginary player whose round of the course, while not brilliant, consists of perfect shots, and whose figures for all the holes are regarded as par. A hole done in one stroke fewer than bogey is a "birdie"; in two better, an "eagle." Colonel Bogey is also the title of a

popular military march composed 1913 by K. Alford (F. Ricketts).

Boghazkoi. Village of Asiatic Turkey, 100 m. E. of Ankara, the site of the Hittite capital Hattusas. A natural stronghold situated at a crossing of roads on the rocky plateau encircled by the Kizil Irmak (Halys) river, Hattusas was probably founded by Hattusil I who transferred his administrative capital hither from Kussara c. 1640 B.C. Subsequent kings enlarged it. It was several times sacked by barbarian tribes but was re-fortified c. 1375 by Shubbiluliuma, in whose reign the Hittite empire reached its largest extent. It fell a little before 1200 B.C. to invaders who ended the Hittite empire. The site was re-settled by the Phrygians and may have been the Pteria captured by Croesus in 550 B.C.

Excavations of the site over many years by the German Orient Society have yielded much knowledge of the Hittites (*q.v.*).

Bogie. A four-wheeled truck, turning on a pivoted centre, for supporting the fore end of a locomotive and unconnected to the driving wheels. Trams are usually mounted on two four-wheeled bogies, but in this case the bogie incorporates the electric motor driving the vehicle. Four- and six-wheeled bogies are used to carry long railway carriages and wagons. Bogies help to distribute the weight of heavy rolling stock and are indispensable on tracks with sharp curves as they enable the wheels to adjust themselves to the direction which gives easiest running. Certain fast passenger trains are made up of articulated sets of carriages with a six-wheeled bogie supporting the front of one carriage and the end of another. Many heavy road vehicles driven by petrol or Diesel engines have four rear wheels in the form of a bogie, the differential being mounted on the leading axle of the bogie. Eight-wheeled road vehicles have a four-wheeled bogie in front, but the wheels are steerable. See Locomotive.

Bog Iron Ore. Pisolitic ore of iron. It consists of a mixture of hydrated oxides formed by the agency of fresh-water algae and bacteria at the bottom of sheets of standing water. Notable examples are those of the Scandinavian lakes, especially in W. Gothland. The deposit forms at the rate of a few inches in from fifteen to thirty years. See Iron Ores.

Bog Moss (*Sphagnum*). Genus of damp, acid-loving mosses, natives of temperate regions all

over the world, growing in bogs and swamps, often covering enormous tracts, and entering largely into the composition of peat.

They differ from other mosses in their spongy structure, certain cells of the leaves and stems being large, empty, and intercommunicating, so that they draw up and hold large quantities of water. The reproductive organs may be borne on the same or on different plants, but are always on separate branches. Male branches have reddish leaves, closely packed in a globular head; female branches have large, loosely packed leaves, and produce usually a single spore capsule, dark brown in colour; when ripe, this explodes, throwing off its lid and scattering the spores. The closely packed plants support each other, and continue to grow at the summit as the lower parts die and form peat, which is compressed by the weight of the living water-laden surface. In this way after thousands of years peat-beds are formed.

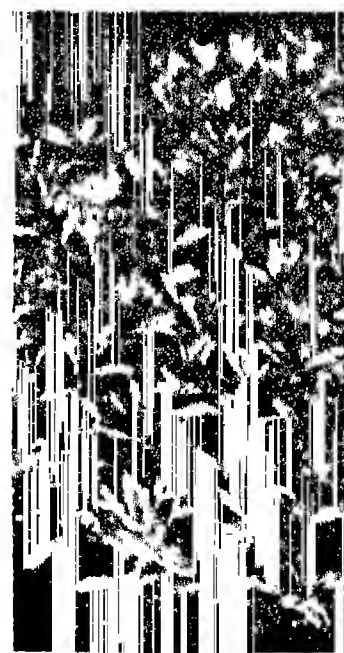
Bog Myrtle OR SWEET GALE (*Myrica gale*). Shrub of the family Myricaceae. A native of W. Europe, N. Asia, and N. America, it grows in bogs and damp moors. Bush-like in growth, it attains a

height of about three ft., and has lance-shaped, yellow-green leaves with coarsely toothed edges and downy undersides, where numerous glands secrete a fragrant wax. The flowers, which appear before the leaves, are very simple, lacking sepals and petals, and are protected by brown scales, which constitute a sort of catkin.

The two sexes are found on separate branches, usually on different plants. The fruits (candle berries) have a fleshy covering to a hard stone with one seed.



Bog Moss. Peat beds are formed from it



Bog myrtle or sweet gale, a fragrant shrub

They are coated with waxy resin. The fruits are thrown into boiling water, when the wax melts and floats to the surface. This is made into small candles, which give off a fragrant odour when burning.

Bognor Regis. Seaside resort and urban district of Sussex, England. It is 7 m. S.E. of Chichester, and has a railway station. It has a pier, with large pavilion and theatre, esplanade, theatre, and other attractions for visitors, and possesses a Norman church and a R.C. priory. The term Regis commemorates the convalescence, in 1929, of George V at Craigwell House (demolished 1953), Aldwick, 1½ m. W. Pop. (1951) 25,647.

Bog Oak. Wood and roots of trees, darkened and in a good state of preservation, found beneath the surface of peat bogs. Among trees found in these conditions are the oak, beech, hazel, yew, and fir, and the colour ranges from black to dark greyish-green. Bogwood is dense and hard, and is made into furniture, ornaments, and trinkets. A considerable industry is carried on in Dublin in carved bog oak ornaments.

Bogolometz, ALEXANDER ALEXANDROVITCH (1881-1946). Russian patho-physiologist. Educated at Kiev Gymnasium and Odessa university, he was professor of patho-physiology at Saratov university, 1911-15. Appointed president of the academy of sciences of the Ukrainian S.S.R., 1930, he carried out research work in connexion with the endocrine glands and published papers on immunity, internal secretion, the pathology of circulation, etc. He claimed to have compounded a serum for the cure of rheumatism and another which would prolong human life for 150 years. He died July 19, 1946.

Bogomili (Slav., dear to God). Greek sect, supposed to have been founded by a Bulgarian bishop named Bogomil in the 10th century. It appeared later in the Balkans and Constantinople, and lingered until the 16th century. Allied to the Cathari, the Bogomili regarded the body as a prison-house of the spirit, and therefore to be subdued by fasting and other forms of asceticism. They rejected all the O.T. save the Psalms and the Prophets, viewed image- and relic-worship as inspired by Satan, and advocated chastity. In 1118 Alexius Comnenus ordered all Bogomili to be burnt alive.

Bogong. Mountain of Australia. It is in Victoria, about 165 m. N.E. of Melbourne, and is the



Bognor Regis. Animated scene on the beach of this popular Sussex resort

highest point (6,508 ft.) of the Victorian section of the Australian Alps (*q.v.*).

Bogos. Pastoral nomad tribe settled in the Eritrean highlands in N.E. Africa, overlooking the valleys of the nomad Beni-Amer, who formerly enslaved them. More primitive Hamites than the Beja, they have, while professing Islam, preserved some early animism (river-worship and serpent-worship). From their Himyarite neighbours they derived their pastoral culture and the self-government they enjoyed when tributary to Abyssinia. See Beja.

Bogotá (formerly Santa Fé de Bogotá). Capital of Colombia, S. America, and of the department of Cundinamarca. It stands on the San Francisco and San Agustín, tributaries of the Magdalena river, on the E. side of a plateau 8,560 ft. high at the foot of the E. Cordillera, connected by rly. with Girardot, 52 m. to the S.W., and with Honda, 65 m. to the N.W. The climate is delightful: mean temp. 57° F. It is well and regularly built. Its chief square, which contains a statue of Bolívar by Tenerani, is surrounded by the president's palace, the former viceregal palace, the cathedral, 1563, and the government buildings. Other buildings are the university, founded 1572; the national library, natural history museum, mint, observatory, military academy, colleges, churches, convents, schools, and theatres.

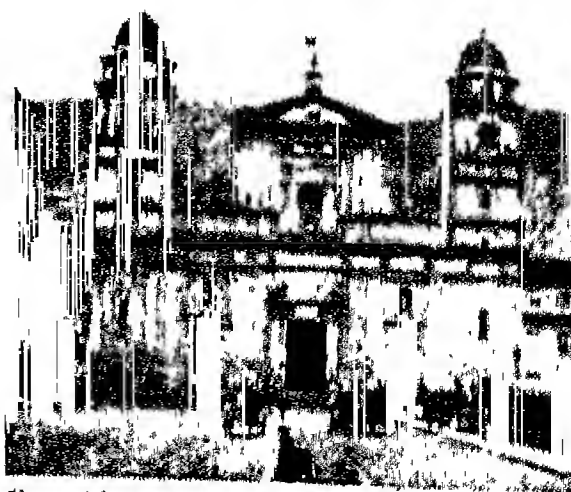
In several of the churches are works by Murillo

and other masters. Bogotá was once a centre of Spanish culture, and claims to speak the purest Spanish in S. America.

Bogotá is the political, social, financial, and cultural centre of the republic, and the distributing point for the fertile central territories, although its trade activities suffer from difficulty of transport. In the locality are large government saltmines, and coal, iron, and other minerals are worked. Founded in 1538, it became the seat of an archbishop in 1561, and in 1598 capital of the Spanish viceroyalty of New Granada. It was almost destroyed by earthquake in 1827. Here, on April 6, 1914, Colombia signed a treaty with the U.S.A. agreeing to the independence of Panama. The national congress meets here annually in July. Pop. (1951) 648,324.

Bog Plants. Plants adapted to a special environment which is rich in organic food reserves but, owing to waterlogging of the soil and subsequent lack of decay-promoting bacteria, is unavailable in any great quantity to plants. The number of plants capable of thriving under such conditions is therefore rather limited. The commonest species are rushes

(*Juncus*), sedges (*Carex*), and bog-moss (*Sphagnum*), which form large tussocks over the surface of the bog. In addition, plants such as cottongrass (*Eriophorum*) bog asphodel (*Narthecium*) and bogbean (*Menyanthes*) and also sweet gale are



Bogotá Colombia. The fine Spanish cathedral, which was built in 1563



Bog Plants. 1. Common butterwort, *Pinguicula vulgaris*. 2. Long-leaved sundew, *Drosera longifolia*. 3. English sundew, *Drosera anglica*. 4. Australian sundew, *Drosera spatulata*

Photos by Ward

abundant. Some plants thrive by virtue of being able to tap other sources of food (insectivorous plants) of which in the U.K. there are the sundew (*Drosera*) and butterwort (*Pinguicula*). Both these plants have rosettes of flat leaves covered by an alluring sticky secretion that attracts and traps small insects, which are then killed and digested by powerful juices. After a period of years bogs tend to dry out and the dead plant material becomes converted into peat. For illus. of *Drosera rotundifolia*, see Sundew.

Bogra OR BAGURA. Dist. and town of East Pakistan (East Bengal), in the Rajshahi division. The district, enlarged in 1947 by the addition of the S. part of the former Dinajpur district, is extremely fertile, rice and jute being the principal crops and providing the bulk of the exports. Sugar, grains, mustard, and rape are also grown. Imports include piece goods, gunny bags, and salt. Area 1,475 sq. m. Pop. (1951) 1,280,587.

The town stands on the Karatoya, 65 m. W. of Mymensingh. It was the capital of an ancient Hindu kingdom from the 3rd century B.C. to the 10th century A.D. There are a number of important archaeological remains. Pop. (1951) 25,303.

Bog Spavin. Condition in horses. It is indicated by a puffy or soft swelling on the inner aspect of the front of the hock due to distension, with fluid, of the capsule of the joint. It is more in the nature of a "blemish" than a cause of real disability, but sometimes there may be lameness due to pain. Bog spavin is generally caused by overwork, but occasionally arises from slipping. Old standing cases, without lameness, rarely require veterinary treatment.

Bog Trotter. Term of derision sometimes applied to Irish peasants, in reference to their skill in finding their way over bogs.

Bogue, DAVID (1750-1825). British divine and author. He was born at Halydon, Berwickshire, Feb. 28, 1750, removed to London, 1771, and held a pastorate at Gosport. He helped to found the London Missionary Society, the British and Foreign Bible Society, and the Religious Tract Society. With James Bennett, he produced a *History of Dissenters, 1688-1808*, published 1808-12. He died at Brighton, Oct. 25, 1824.

Bogue Forts. Heavily fortified islands in the narrow channel at the N. end of the estuary of the Canton river, S. China, called Bocca Tigris (tiger's mouth) or the Bogue. They were captured by the

British in 1841 during the "opium war" of 1840-42, and again in 1856.

Boguslav. Town of Ukraine S.S.R., in the prov. of Kiev. On the Rossa river, 110 m. by rly. S.E. of Kiev, it makes cloth and trades in leather, wool, and sheepskins. It became Russian in 1793.

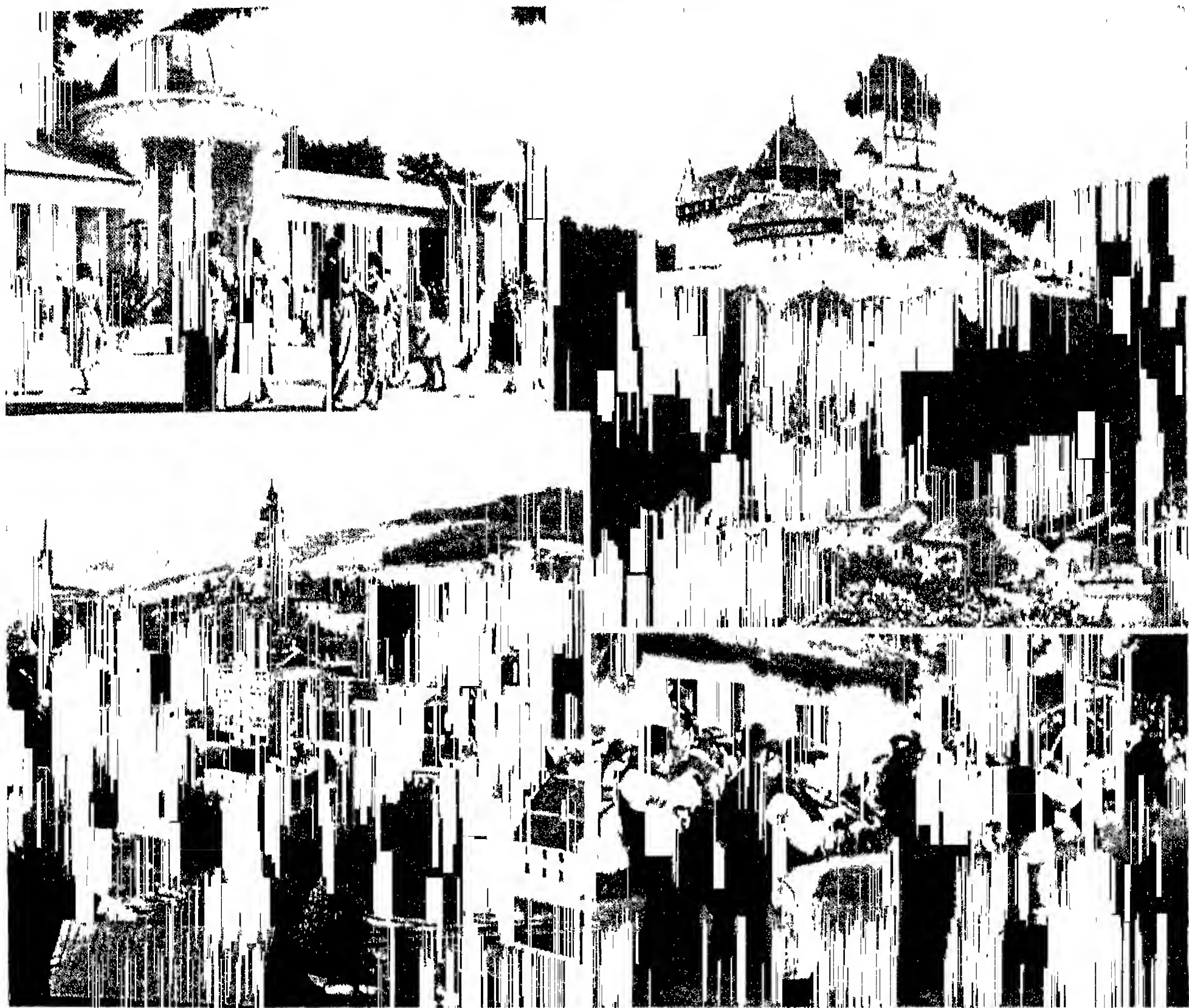
Bogy OR BOGGER. Indefinite object of terror, or supernatural appearance. Generally used as a vague term to frighten children, it is applied to any merely imaginary evil. Supposed to be derived from the Welsh *bug*, a ghost, it is connected with bugbear, boggle, and other words denoting vague but real terrors of the imagination.

Bohain-en-Vermandois. Village of France, in the department of Aisne, on the rly. from Le Cateau to St. Quentin. It was the scene of considerable fighting when it was captured by American troops and the British wing of the 4th army in the second battle of Le Cateau, Oct., 1918. Bohain has a trade in machine-made embroidery. The home lacemaking industry round Bohain and Le Cateau was wantonly destroyed by the Germans. Pop. (1954) 6,151. See Le Cateau.

Bohea. Variety of black China tea. The plant, classified by Linnaeus as *Thea bohea*, grows in Fukien prov., China, the name being derived from Wu-i (*pron.* bou-y), the name of the hills where it is grown. The word bohea was used in the 18th century for tea in general. Commercially, the name is sometimes used for a poorer sort of late-grown leaf.

Bohème, LA. Opera in four acts by Puccini (*q.v.*). The libretto, by Giacosa and Illica, was based on four episodes from Murger's novel *Scènes de la Vie de Bohème*, and gives a romanticised picture of bohemian life in the Paris of the 1830s. It was produced at Turin, Feb. 1, 1896, and subsequently became one of the most popular operas in the repertory. Famous arias are *Your Tiny Hand is Frozen*, and the waltz song *As Through the Streets I wander*.

Bohemia. (Cz. Cechy; Ger. Böhmen). An ancient division of central Europe, formerly a province of Austria-Hungary (see map of that empire) and later of Czechoslovakia. It ceased to be an entity on Jan. 1, 1949, when it was divided into eight administrative regions (Prague, České Budějovice, Pilsen, Karlovy Vary, Usti, Liberec, Hradec Králové, and Pardubice, each named after its chief town. The province of Bohemia



Bohemia. Top left, promenaders at Marienbad (Marianske Lazne) spa. Top right, the castle of Karlstein (Karlův Týn), in the Bohemian forest. Bottom left, the little town of Krumau (Cesky Krumlov), on the river Moldau (Vltava), seen in the foreground. Bottom right, musicians, some in traditional dress, playing dance music in a Bohemian country town

occupied a diamond-shaped plateau. This plateau is drained by the upper Elbe (Labe) and its tributaries, and is separated from the Alps by parts of Bavaria and Austria and by the Danube. Except the Elbe outlet, the gateways to the plateau are hill or mountain passes, *e.g.* the Neumark pass, 1,473 ft., over the Bohemian Forest, near Taus (Domazlice).

Early Invasions

HISTORY. It is generally accepted that Bohemia derived its name from the Boii, a Celtic people. The country was part of the great Hercynian forest, and was invaded in turn by Cimbri, Dacians, Marcomanni, and Goths. The Romans sent armies into the area on several occasions, but never occupied it. Of the Slav peoples who settled in the region, the most important were the Cesky (conventional English Czechs) whose name was first noticed by western and Byzantine historians in the 6th century; it was

gradually extended to all the inhabitants. Until the close of the 8th century, little is known of the country beyond legend and fairy tale.

Charlemagne attacked Bohemia in 805 and appears to have established a suzerainty and exacted tribute. About the close of the 9th century, after the arrival of the missionary monks Cyril and Methodius, Christianity began to gain ground in Bohemia. Alternate contests with and subjection to the Germans went on for centuries, German aid being frequently sought by rival claimants to the Bohemian throne, succession to which was long vested in the eldest living descendant of the legendary Przemysl. In 1251 the heir was chosen as duke of Austria, and in 1253 he succeeded his father as Przemysl Ottokar II. He extended his dominions to the Adriatic and the Baltic, but was attacked in 1275 by the German king Rudolph I, who compelled him to yield all except Bohemia and

Moravia. In 1278 he was defeated and killed on the Marchfeld. His grandson Wenceslaus III was assassinated in 1306 after a reign of one year, and with him ended the dynasty of Przemysl.

The German king Albert revived an old claim that Bohemia was a fief of the Empire, and intimidated the nobles into electing his son Rudolph as their king. Next but one was elected John (reigned 1311-46), count of Luxemburg, who married Elizabeth, sister of Wenceslaus III. King John became blind, and was killed at Crécy, 1346; his device of three feathers was thereupon assumed by the Black Prince.

Orderly Rule Restored

John's son Charles (the Emperor Charles IV from 1349) reigned 1346-78 in Bohemia where he re-established justice and order, and founded the University of Prague, 1348; he is remembered as one of the best kings of Bohemia. In 1364 Charles entered into a treaty with

the duke of Austria which provided that if the dynasty of either country failed, the ruler of the other should acquire it. Wenceslaus IV (1378-1419) quarrelled with the church and caused John of Pomuk (S. John of Nepomuk, Bohemia's patron saint) to be thrown into the Vltava (Moldau) river. His sister Anne (d. 1394) married Richard II of England in 1382 (N.S.) and to her influence is attributed the spread of Wycliffite doctrines in Bohemia. The great Bohemian preacher and reformer Hus was burnt at Constance, July 6, 1415, as a recusant heretic; his influence and martyrdom made Bohemia an isolated centre of the Reformed religion on the Continent. His death was followed by the Hussite wars when, under the leadership of Ziska and his successor Prokop, the Bohemians fought heroically for their beliefs. Sigismund, German emperor and king of Hungary, was also heir to Bohemia, and eventually succeeded in establishing himself in Prague.

During the minority of Ladislav Posthumus, the regent George of Podebrady was the leader of the national party, and on the death of Ladislav he was elected king. During his reign, 1457-71, Bohemia enjoyed a period of prosperous peace. He was succeeded by the weak Wladislaw, prince of Poland, later king of Hungary. His son and successor Ladislav II (reigned 1516-26) was killed in battle against the Turks at Mohacs. Ferdinand (I) of Hapsburg, archduke of Austria, king of Hungary, and later German emperor, who had married Ladislav II's sister Anna, was elected king, and from that time Bohemia became increasingly subject to Austria.

Religious Conflicts

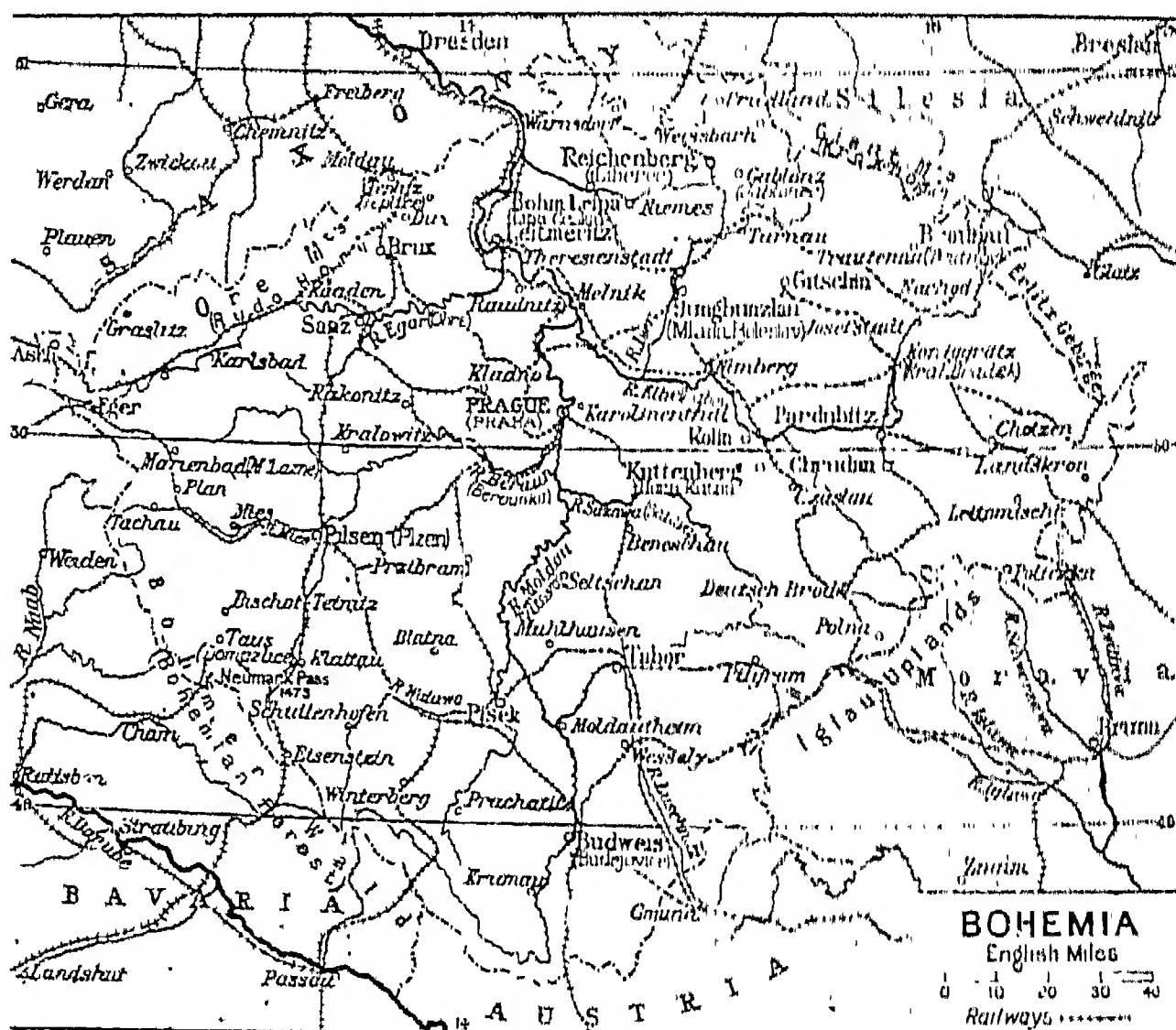
During the religious wars that broke out in Germany in the first half of the 16th century, the Bohemians hesitated to support their R.C. ruler against the Protestant reformers with whom they were much in sympathy. After the temporary overthrow of the Protestants by the emperor Charles V at the battle of Mühlberg, April 24, 1547, Ferdinand marched on Prague, and punished his Bohemian subjects.

Religious conflict of varying intensity continued through successive reigns; in 1618 a general assembly of Protestants in the old Hradčany palace at Prague addressed remonstrances to representatives of their R.C. king, the emperor Matthias (reigned in

Bohemia 1611-19). The Protestant leaders went armed to a meeting, and after a stormy discussion threw the king's two representatives and their secretary out of a window of the palace. This "defenestration," May 23, 1618, began the Thirty Years' War. The Bohemian diet elected as king the Protestant Frederick V, Elector Palatine (1619-20), who had married Elizabeth, daughter of James I of England and VI of Scotland. Frederick failed to get the support he expected from the Protestant rulers; on Nov. 8, 1620, near Prague, he was defeated in the decisive battle of the White Mountain by the forces of the

returned to claim the whole area and announce the expulsion of all Sudeten Germans. Bohemia, thus returned to Czecho-Slovakia, remained an administrative entity until it was abolished as a province in 1949.

LANGUAGE AND LITERATURE. Bohemian or Czech forms with Polish the western group of the Slavic language. Its literature is divided into three periods. The first known writings are undated religious songs and legends of saints. The earliest prose work in the language, called the book of the old lord of Rosenberg, belongs to the close of the 13th century or the early part of the 14th, and



Bohemia. Map of the former province of Austria-Hungary and, later, of Czecho-Slovakia, abolished as an administrative unit in 1949

emperor Ferdinand II, who had succeeded Matthias in 1619. Frederick and Elizabeth fled and Hapsburg rule of the ancient kingdom became absolute. Bohemia remained part of the Holy Roman Empire, and later of the Austro-Hungarian empire, until the end of the First Great War, when it became part of the new republic of Czecho-Slovakia.

By the Munich Agreement (*q.v.*) of Sept., 1938, the Sudeten-German border districts of Bohemia were annexed to Germany. After the occupation of Czecho-Slovakia by the Germans in March, 1939, the Czech-inhabited area of Bohemia was declared a German protectorate.

Bohemia was liberated by the U.S. 3rd army during April, 1945; and the exiled Czech government

about the same time translation of the Bible into Bohemian was completed. Fairly definite literary chronology begins about the same time as the foundation of the University of Prague, 1348. To the same century belongs the first historical work in Bohemian, the rhymed chronicle of Dalimil, from the deluge to 1310.

The middle period begins with the Hussite wars and with a literature consisting mainly of theological pamphlets or treatises. John Zizka wrote a fine war song which has been compared with the Marseillaise. Peter Chelchicky (c. 1390-1460), a socialistic religious writer, has been regarded as a forerunner of Tolstoy.

After the overthrow of Bohemian nationality in 1620 the language was proscribed and its

literature destroyed wholesale. A revival began in the closing decades of the 18th century. Paul Joseph Shafarshik (1795-1861) produced an important work on Slavonic antiquities, 1837; and Francis Palacky (1798-1876) was a great historian, whose history of Bohemia had an incalculable influence in re-awakening and strengthening national consciousness. The development of literature in the Bohemian language after the establishment of Czechoslovakia as an independent state is described in the article dealing with that country.

Bohemian Brethren. Christian community formed in the 15th century from the extreme section of the Hussites. They were later called Moravian Brethren (*q.v.*).

Bohemian Forest (Ger. Böhmer Wald). Mt. range of Europe. It extends c. 150 m. along the Czechoslovak-German border, from the Fichtel Gebirge in the north-west to the Danube near Passau in the south-east. Its average breadth is about 30 m., average altitude about 3,500 ft. It is densely wooded, with numerous lakes. The highest peaks are the Arber, 4,790 ft., and the Rachel, 4,770 ft. Parallel with this range on the south-west is the Bavarian Forest range. The whole area is noted for its glass industry.

Bohemian Girl, THE. Opera by the Irish composer, Michael William Balfe. First produced at Drury Lane on Nov. 27, 1843, it was subsequently given all over the Continent and the U.S.A. and continued to be widely popular for many years. It was revived by Sir Thomas Beecham at Covent Garden during the season in Elizabeth II's coronation year, 1953. Its best known aria is I Dreamt that I Dwelt in Marble Halls.

Bohemianism. Term applied specifically to the free and irresponsible mode of life common among students, artists, writers, and actors, and generally to unconventional tastes and habits. When the gipsies first appeared in France in the 15th century, the French, thinking they had come from Bohemia, called them Bohemians. By an easy transition the name came to be applied in France to others who defied the conventions, and in this sense was introduced into English by Thackeray in his *Adventures of Philip* (1861). An intimate picture of bohemian life in Paris is given in *Scènes de la Vie de Bohème* (1851) by the French writer Henri Murger, who defined Bohemia as

"a stage of the artist's career -- the preface to the Academy, the hospital, or the Morgue."

Bohemond I (c. 1056-1111). Prince of Antioch. The eldest son of Robert Guiscard, the Norman duke of Apulia, he served under his father in the war against the East Roman emperor, Alexius Comnenus. He then waged war with his brother Roger, who had claimed Apulia on the death of Guiscard, receiving the principality of Tarentum when peace was made.

Bohemond joined the First Crusade, and on the fall of Antioch in 1098 remained in possession of that city, taking no part in the capture of Jerusalem. He ruled as prince of Antioch in defiance of the emperor Alexius until 1100, when he was taken prisoner by the Turks. Released in 1103 and defeated by the Turks in 1104, he sailed for Europe and raised an army in France. With these troops he renewed war with Alexius in 1107, and in 1108 was acknowledged as the tributary prince of Antioch. The remainder of his life was spent in Apulia, where he died. His son Bohemond II was killed in battle in 1130. There were other Bohemonds at Antioch, which city in 1268 was taken from Bohemond VI by the Mamelukes. Bohemond VII (d. 1287) was the last prince of Antioch.

Bohle, ERNST WILHELM (b. 1903). German politician. Born July 28, 1903, of German parents, at Bradford, Yorks, by reason of his parentage and travels in S. Africa, he was made in 1937 head of a foreign organization of the Berlin foreign office. He was entrusted with "the uniform guardianship of the Germans abroad," responsible to the deputy leader (Rudolf Hess), with power of taking part in cabinet meetings. He and his organization were responsible for most of the German espionage, sabotage, and fifth columns before and during the Second Great War. Because of his birth in Bradford Hitler proposed to make him Gauleiter of Britain when it had been conquered. Bohle was condemned to five years' imprisonment for membership of the S.S. by a U.S. military tribunal at Nuremberg, April 14, 1949.

Böhmer Wald. German name of the mt. range called in English the Bohemian Forest (*q.v.*).

Bohn, HENRY GEORGE (1796-1884). British publisher. Son of a German bookseller settled in England, he was born in London, Jan. 4, 1796. In 1831 he started

business for himself in Covent Garden, chiefly as a second-hand bookseller, and in 1841 issued a guinea catalogue of rare books



Henry G. Bohn.
British publisher

containing over 23,000 entries. Taking up the remainder trade, he purchased copyrights as well as surplus stock, and in 1846 began

the publication of his standard and other libraries of cheap reprints and translations, which eventually totalled nearly 700 volumes; some of the books he edited and translated himself. A Greek and Latin scholar, he wrote for the Philobiblon Society a monograph on *The Origin and Progress of Printing*, 1857 8; edited a reissue of Lowndes's *Bibliographer's Manual*, 1857 64; and compiled a *Dictionary of Quotations from the English Poets*, 1881. He retired in 1864, when the libraries were acquired by Bell and Daldy, and died at Twickenham, Aug. 22, 1884.

Bohol or **Boac**. One of the Philippine Islands, between Mindanao, Cebu, and Leyte. It is mountainous and produces gold, copper, coal, timber, sugar, cocon, tobacco, and cotton. It is 47 m. long by 34 m. broad, and has an area of 1,440 sq. m. Tagbilaran is the capital. Pop. 460,800.

Bohr, NIELS HENRIK DAVID (b. 1885). Danish physicist. He was born and educated at Copenhagen, where he took his D.Sc. in 1911. He went to Cambridge as assistant to J. J. Thomson at the Cavendish laboratory, and in 1912 to Rutherford's laboratory at Manchester, where he evolved those conceptions of atomic structure with which his name became linked. In 1916 Bohr was appointed professor of theoretical physics at Copenhagen, and four years later was instrumental in establishing at the university an institute of theoretical physics, of which he became the first director. This was visited by scientists of all nations.

Bohr published his first papers on the quantum theory (*q.v.*) while at Manchester; and in 1921 his demonstration of the applicability of the theory to the structure of the atom led to the discovery of hafnium (*q.v.*). In 1922 Bohr was awarded the Nobel prize for physics, and in

1926 elected F.R.S. In 1938 at the annual meeting of the Royal Society he described the discovery of a new type of particle called the *yukon*, which has an important bearing on the phenomena of nuclear disintegration. Bohr's assumptions on atomic structure are accepted as fundamentals of this branch of physics. His work is regarded as the most important contribution to the modern theory of spectra and atomic structure.

He was experimenting in Copenhagen to achieve a practical demonstration of the release of atomic energy when the Germans invaded Denmark in 1940. His institute and apparatus for producing powerful radio-activity were taken over by the Germans; but he refused to collaborate, and in 1943 escaped to England, thence to the U.S.A., where he joined the body of scientists whose work resulted in the production of the atomic bomb (*q.v.*).

Bohun. Name of an English family which became notable in the 13th and 14th centuries. It is taken from a village in Normandy and a member of the family came to England about the time of the Norman Conquest. In Henry I's reign, Humphrey Bohun held a position in the king's household, and in 1199 Henry Bohun, a nephew of William the Lion of Scotland, became earl of Hereford and was one of the barons chosen to see that the terms of Magna Carta were observed. His son Humphrey inherited the earldom of Essex and took an active part in the baronial wars of the 13th century under Simon de Montfort.

A later Bohun won fame as one of the two earls who forced Edward I to confirm the charters in 1297, and his son, another Humphrey, married a daughter of the king. This Humphrey was made prisoner at Bannockburn, where Sir Henry Bohun was slain, but both before and after that battle was one of those who rebelled against Edward II. When Humphrey, earl of Hereford, Essex, and Northampton, died in 1373, the male line of the family became extinct. One of his sisters was married to Thomas of Woodstock, duke of Gloucester, and the other to the prince who became Henry IV, and to them the Bohun lands passed. *Pron.* boon.

Bohus. Inlet between S.W. Sweden and S.E. Norway. It is connected with the North Sea by the Skagerrak, the Oslo Fiord being

an inland extension, and derives its name from Bohus, a district forming part of the Swedish lan or county of Giteborg and Bohus.

Boie, HEINRICH CHRISTIAN (1744–1806). German author. Born at Meldorf, in the prov. of Slesvig-Holstein, July 19, 1744, he was educated at Jena and Göttingen. At Göttingen, indignant at Wieland's sympathy with foreign ideas, he and some other students formed the Dichterbund (League of Poets) or Hain, a society for the cultivation of poetry, friendship, manly virtue, and love of country. With little poetical talent himself, he was well fitted to act as the literary critic of the movement. During 1770–75 he directed and edited the Göttingen Musenalmanach, first with Gotter, then alone; the paper was founded on the model of a French Almanac des Muses. In 1776 he brought out *Das Deutsche Museum*. He died at Meldorf, March 3, 1806.

Boieldieu, FRANÇOIS ADRIEN (1775–1834). French music composer. Born at Rouen, Dec. 16, 1775, he won local success with his operas *La Fille Coupable*, 1793, and *Rosalie et Myrza*, 1795, and moved to Paris. His first three operas, *Les Deux Lettres*, 1796, *La Famille Suisse*, 1797, and *Le Calife de Bagdad*, 1799, were produced with success at the Opéra Comique. His next work, *Ma Tante Aurore*, 1802, marked a distinct advance in his style. During 1803–11 he was at St. Petersburg acting as maître de chapelle to the tsar. Returning to Paris, he brought out *Jean de Paris* in 1812, succeeded Méhul as professor of composition at the Conservatoire in 1817, produced *Le Chaperon Rouge* in 1818, and brought out his masterpiece, *La Dame Blanche*, in 1825. He died at Jarcy, Oct. 8, 1834.

Boii. Ancient Celtic people, who, some centuries before the Christian era, migrated from their original homes in N. and N.W. Germany. One section, penetrating into Italy, settled in what became known as Gallia Transpadana, i.e. the region between the Po and the Apennines. They were subjugated by the Romans in 191 B.C. The other section settled in and gave its name to Bohemia, whence they were expelled by the Marcomanni about the beginning of the 1st century A.D.

Boil. Small abscess in the skin due to infection of a sweat gland or of a hair follicle with a staphylococcus. In consequence,

regions which are particularly subject to sweating, growth of hair, or constant friction are the commonest sites—*e.g.* in men, the back of the neck, where the collar rubs. Pus forms round the infected area and produces a pink raised patch, which develops a yellow centre and usually bursts of its own accord. Sometimes a boil subsides without suppurating; then it is known as a blind boil. Boils often occur in crops in people who are run down or suffering from a debilitating disease such as diabetes or chronic nephritis.

Local treatment consists in the application of hot kaolin poultices or magnesium sulphate with glycerine to make the boil regress or ripen. If the ripe boil fails to burst, incision may be necessary to allow of free drainage. Contrary to popular belief, no boil should ever be squeezed, as squeezing destroys the power of the surrounding tissues to bring aid to the suffering area; nor covered directly with sticking plaster. General treatment should include sunlight on the skin which kills the germs and raises resistance, and the administration of Vitamin B, of which brewer's yeast is the most active form. Preparations of tin have a specific action on the staphylococcus. A vaccine is successful in some cases.

Boileau-Despréaux, NICOLAS (1636–1711). French satiric poet and critic. He was born, the fifteenth child of Gilles Boileau, a clerk of the parlement, in Paris, Nov. 1, 1636. After having studied first for the Church and then for the law, being called to the bar in 1656, he decided to adopt a literary career. In 1660 he wrote *Adieux d'un Poète à la Ville de Paris*, the first of his satires on classic models, which for some years he produced in the name of Despréaux, from a property he had inherited. In 1674 he published *L'Art Poétique*, inspired by the *Ars Poetica* of Horace; the first four cantos of a serio-comic epic, *Le Lutrin*; and his fourth and fifth Epistles.

Boileau was appointed historiographer to the king, 1677, and elected to the Academy, 1684, by royal request. He died at Auteuil, March 13, 1711. Two years later was published his prose *Dialogue des Héros de Roman*, which severely attacked the popular romantic novels. His best known work was *L'Art Poétique*. His influence on French literary style has been pervasive and permanent.

BOILER: TYPES AND CAPACITIES

J. W. Cowan, M.I.H.V.E

Here are described and illustrated the main varieties of boiler, including those for the heating of water for domestic and industrial use and those designed for steam generation. See also Engine; Heating; Locomotive, etc.

A boiler is essentially a vessel in which water or other liquid is boiled but the term is loosely applied to a vast number of units designed only to heat water. These latter are known as hot-water boilers to make a distinction between such heaters and the steam generating boiler in which water is boiled and evaporated.

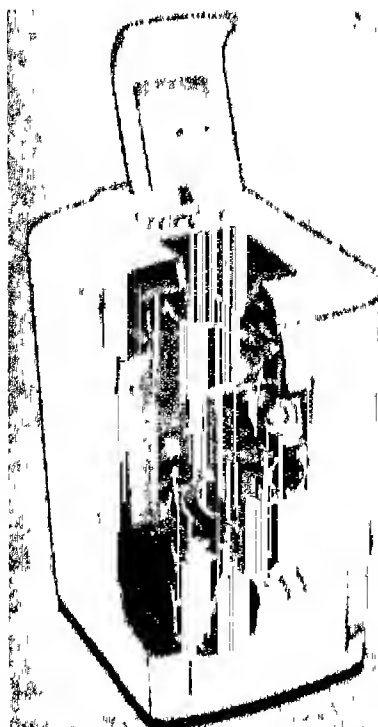
HOT-WATER BOILERS. The simplest forms of hot-water boiler are those used for the domestic supply of hot water and central heating. They consist of circular or U-shaped water jackets surrounding a fire-grate and combustion chamber. They are made in various sizes to supply storage tanks of from 20 to 150 gall. capacity. The absence of indirect heating surface, arising from direct connexion of the fire-box with the chimney, limits thermal efficiency to approx. 40 p.c. Another type of domestic water heater (fig. 1) incorporates an adjustable internal thermostat, operated by water temperature, to control the primary air supply to an otherwise airtight fire-box. The heavily insulated casing and large fuel capacity extend the stoking interval to 8 to 12 hours, and give an efficiency of 70 p.c.

This type of boiler burns anthracite, finely-screened coke, or any of the patent fuels, and in addition to supplying hot water to bath and basin taps will serve three or four radiators for central heating. Regularly cleared of ash, it burns indefinitely.

Sectional boilers are commonly made of cast iron, welded steel, or wrought iron plates. The boilers consist of a series of separate sections each about 6 ins. wide, which are assembled on hollow nipples and bolted together to form a fire-tight and watertight unit. The size and capacity of the boiler can be varied by using more or fewer of the intermediate sections. Water-cooled firebars provide extra heating surface, prolong indefinitely the life of the firebars, and reduce the formation of clinker.

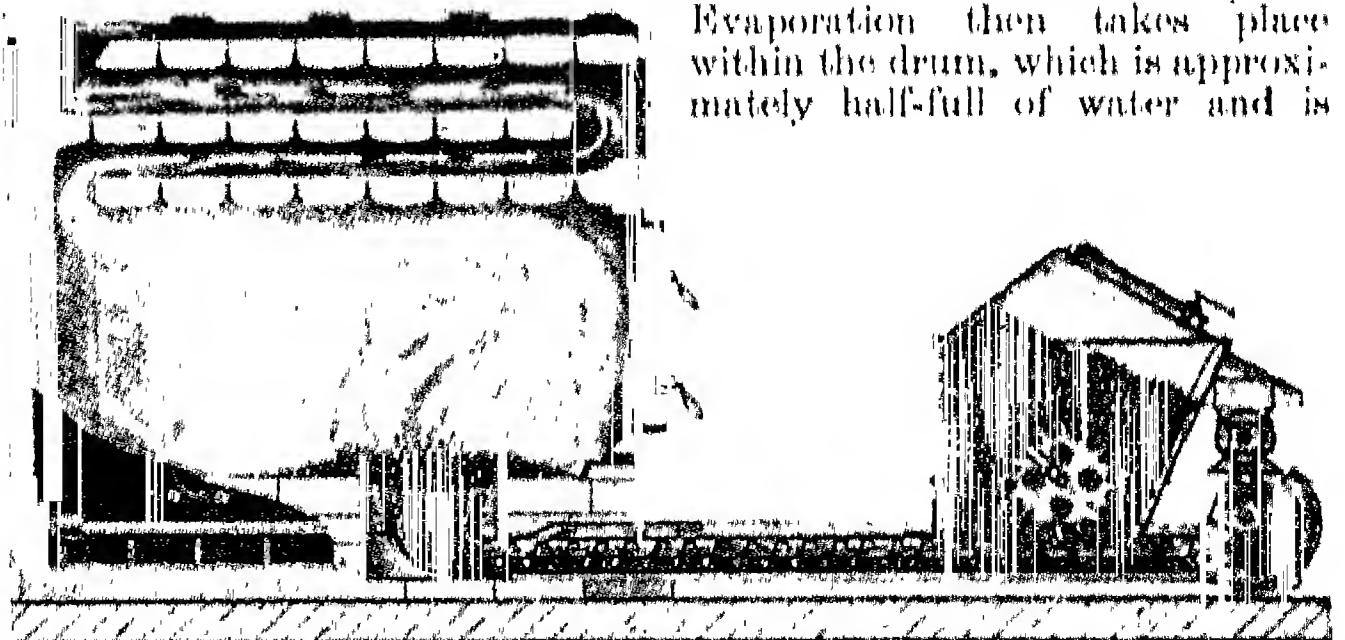
Boilers with water-cooled grates

are suited only to hand-firing and magazine fuel feed, the permanent bars preventing conversion to mechanical stoking (Fig. 2), or to oil burning (Fig. 3). One of the long assembly bolts is seen clearly in the latter picture. Sectional boilers are normally used for hot-water central heating installations. Some patterns may be specifically designed for direct domestic hot-water supply. It is generally better to use a heating boiler, and to warm the service water indirectly by means of an indirect hot-water cylinder, or water-to-water calorifier (*q.v.*).



Boiler. Fig. 1. "Agama-tic" boiler, for domestic hot water

The normal rating of a sectional boiler is of the order of 4,400 B.Th.U. per hour per one sq. ft. of direct heating surface. This is only 0.4 of that of the firepot boiler, despite the additional indirect heating surface provided by the side and top flues (as seen in Fig. 3), and a heating surface to grate area ratio of between 10 and 15 to 1. This conservative estimate is based upon a stoking interval of from 5 to 6 hours, and represents the average hourly heat intake of the water during the slow burning of one charge of fuel over that period. Sectional boilers are used in sizes having ratings between 30,000 B.Th.U./hour sufficient only for a small cottage - to upwards of two millions per single unit. Assuming good fuel,



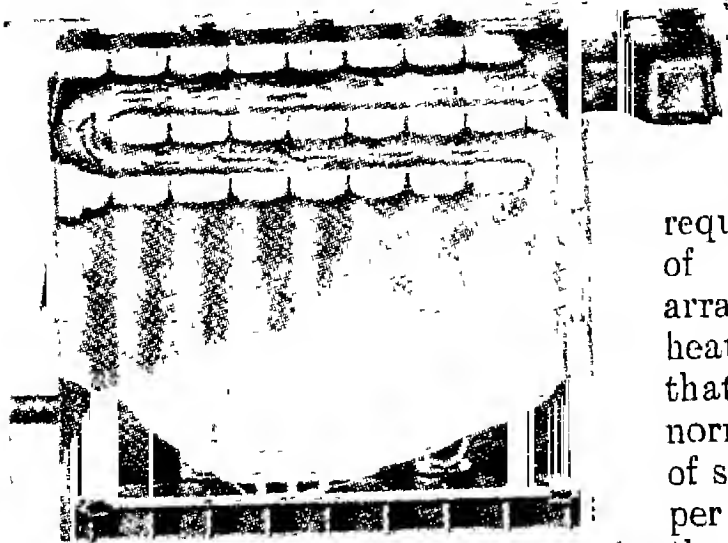
Boiler. Fig. 2. Whitehall hot-water boiler with automatic stoker
Crane Ltd.

preferably gas coke, and reasonably able hand firing and flue-cleaning, the thermal efficiency of a sectional boiler should average 70 p.c. of the potential heat of the fuel.

The magazine fuel feed already mentioned is exemplified in Fig. 4. The fuel hopper is here designed to contain enough fuel to ensure continuous operation for long periods without attention. The inclination of the grate whether water-cooled or grille type is such as to ensure a gravitational flow of fresh fuel into the combustion chamber at the same rate as the earlier supply burns to ash at the bottom of the sloping bars. Magazine boilers may also be of sectional cast iron, but, as seen in Fig. 4, are more often of welded steel. One type has grille bars and operates upon natural draught under thermostatic control. The "Selfstoke" boiler (Fig. 4) has a water-cooled grate and employs forced draught from the electrically motored fan on the left of the illustration. The boilers shown are arranged for hot water, but both are equally suited to the generation of low pressure steam; the automatic controls would then be actuated by a pressure-stat, instead of a thermostat.

STEAM BOILERS. Cast iron sectional boilers are suited to low steam pressures, not exceeding 15 lb. per sq. in. This is usually sufficient for steam central heating installations, many of which operate at gauge pressures of about 3 lb. When intended specifically for steam generation, the boiler sections are designed to provide ample steam space above the normal water level.

Sectional boilers designed for water heating may also be used for steam generation but must be provided with a steam drum, of welded or riveted steel plate. Evaporation then takes place within the drum, which is approximately half-full of water and is



Boiler. Fig. 3. Whitehall hot-water boiler fitted with oil burner
Crane Ltd.

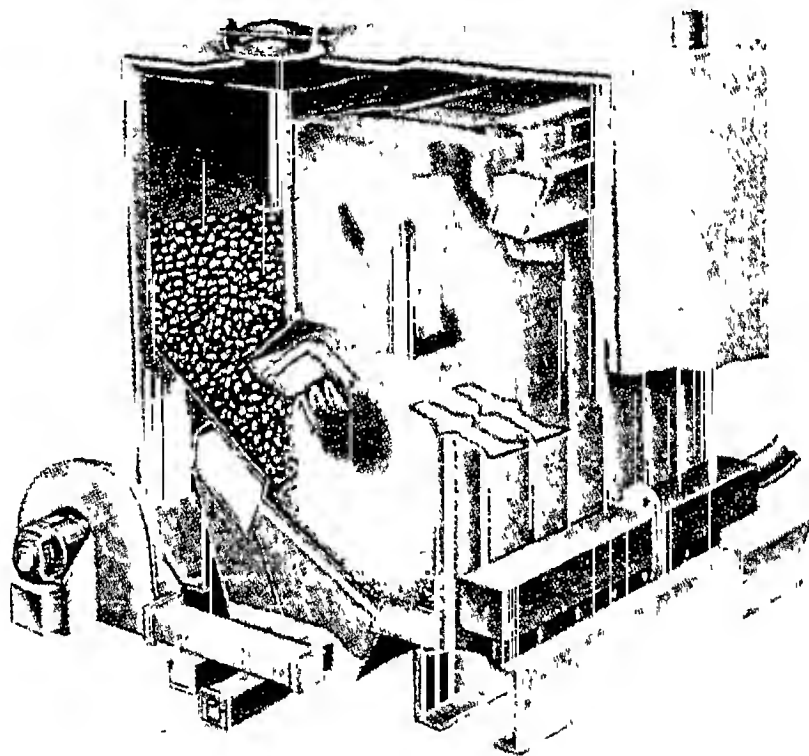
connected to the top of the boiler by several flanged pipe connexions.

In the smaller sizes the medium pressure industrial steam boiler is frequently of the vertical cross-tube pattern. While boilers of this class are normally intended for operating pressures up to 100 lb. gauge, they may be built to withstand somewhat higher pressures. The standard sizes vary in evaporative ratings from 300 to 2,000 lb. of steam per hour. Such figures are normally based upon an estimated evaporation of from 5 to 8 lb. of water at 212° F. to steam at this temperature per 1 lb. of coal burned in the firebox. Assuming coal having a calorific value of 13,000 B.Th.U. per pound, this indicates a lower thermal efficiency of 40 p.c., and an average of barely 50 p.c.—and even this presupposes reasonably skilled hand-firing and attention.

The modern developments of the basic cross-tube boiler are exemplified in Fig. 5. This shows the nests of small-bore water tubes of seamless hot-drawn steel that traverse the upper portions of the fireboxes. These tubes lie at a slight inclination to the horizontal in order to promote the free separation of steam from water, and also to ensure a positive circulation of water across the boiler. They are "staggered" to provide for the maximum "scrubbing" action by the hot gases passing upwards between the tubes towards the uptake, and arranged to increase the heating surface/grate ratio to fully 15 to 1. The criss-cross setting (Fig. 5) is designed to impart a helical

motion to the gases passing from the lower firebox to the uptake. This illustration also shows the fusible plug that is required by law in the crown of every steam boiler. These arrangements of additional heating surface are so effective that the evaporative capacity is normally between 7 and 9 lb. of steam "from and at 212° F." per 1 lb. of coal consumed, and the thermal efficiency of the order of 70 p.c. Boilers of this kind are used for duties up to 6,000 lb. of steam per hour at

working pressures between 100 and 200 lb. gauge. The arrangements of the water-tubes (Fig. 5 again) would admit of these boilers being described as multi-tubular, although this term is more



Boiler. Fig. 4. Selfstoke magazine hot-water boiler; fuel hopper ensures mechanical operation for long periods
Brockhouse Heater Co., Ltd.

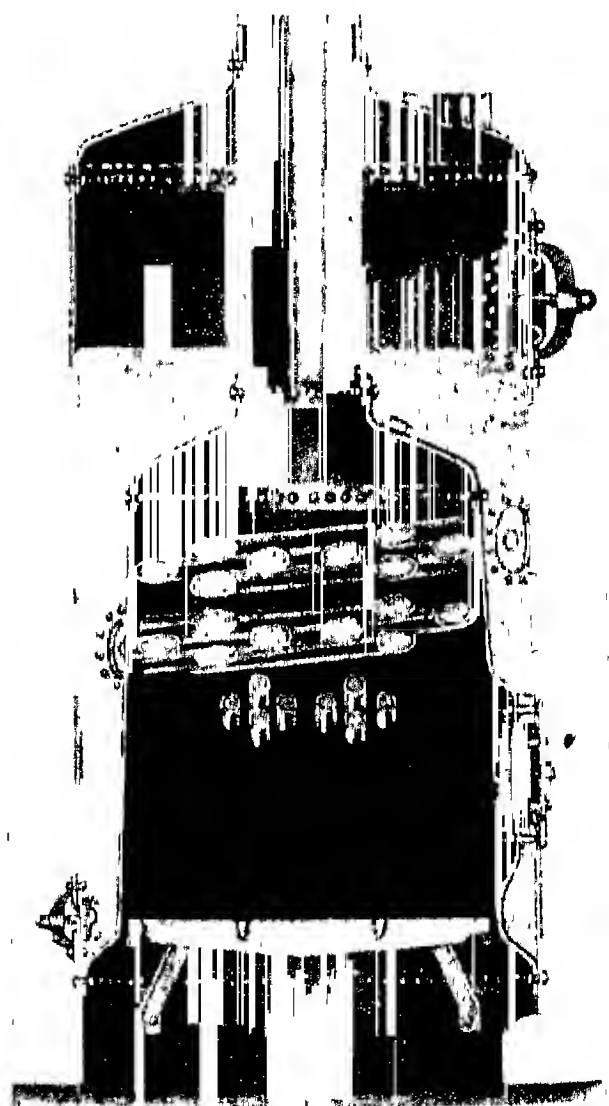
usually applied to smoke- or fire-tubes than to water-tubes. These essentially cross-tube boilers, correctly termed the water-tube vertical pattern, should not be confused with the larger vertical-water-tube boilers (Figs. 12 to 14 inclusive).

Efforts to improve upon the low thermal efficiency of the plain vertical boiler, and yet retain the space-saving feature of this pattern, have also led to the modification known as the smoke-tube boiler. This consists of the suspension of a central water chamber from the crown of the firebox, provision for water circulation between this chamber and the sides of the shell, and the insertion of numerous smoke-tubes between the combustion chamber and the smoke-box on top. The additional direct and convective heating surface thus provided, together

with the greatly improved circulation, establish an evaporative capacity of between 7 and 9 lb. of steam per 1 lb. of coal as above.

Vertical boilers in general are entirely self-contained, and also require the minimum floor space without elaborate foundations. The plain cross-tube pattern would normally admit of the use of raw feed water that would be quite unsuitable for a more efficient steam generator. Disadvantages are the comparatively high rate of combustion, the relatively short travel of the flue gases, and the proportionately lower thermal efficiency.

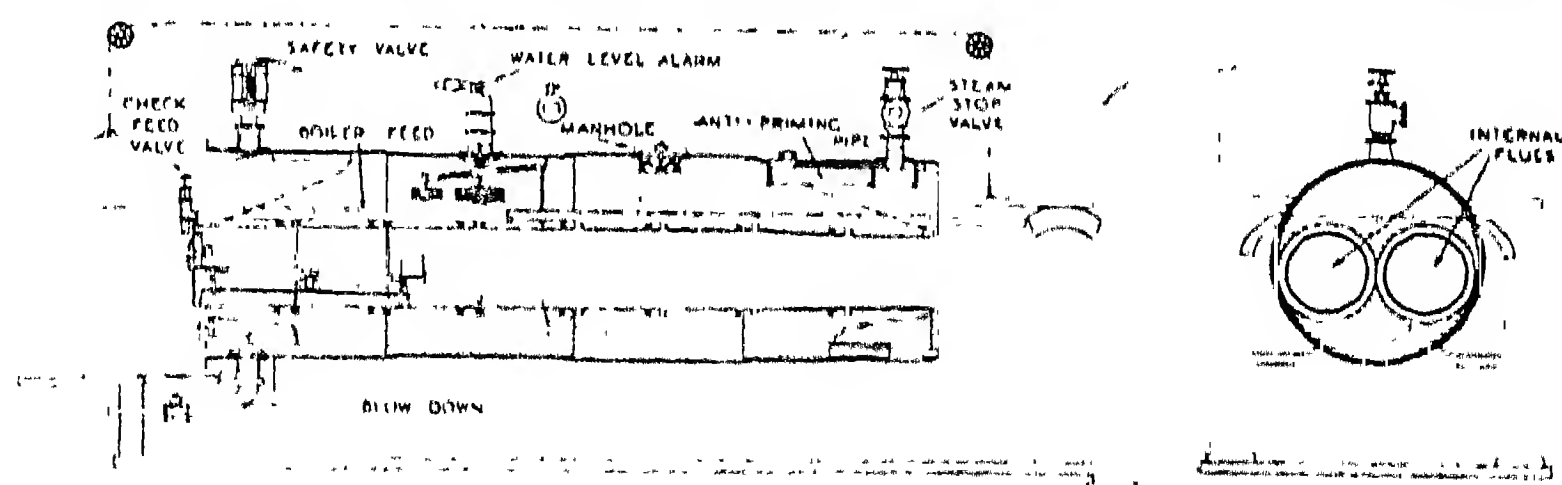
MEDIUM PRESSURE STEAM BOILERS (HORIZONTAL). The Cornish and Lancashire boilers (Figs. 6 and 7) exemplify the simplest arrangement of the horizontal internal flue shell type of boiler. This was designed to provide a relatively large area of indirect heating surface, and a greater length of travel for the flue gases than is normally possible within a self-contained unit. The cross-sections on the right of the illustrations show the general arrangement of the brickwork "settings" within which these boilers must be housed in order that the greater proportion of the outer shell may serve as convective heating surface. In both, the products of combustion pass over the fire bridge and move rearwards along the internal flue,



Boiler. Fig. 5. Vertical Thermax water-tube steam boiler, requiring little floor space

Buston & Hornsby, Ltd

then travel towards the front via the bottom flue(s), and thence to the chimney in rear via the side flues on right and left of the outer shell. Modifications of the basic Lancashire design may employ cross-tubes situated in



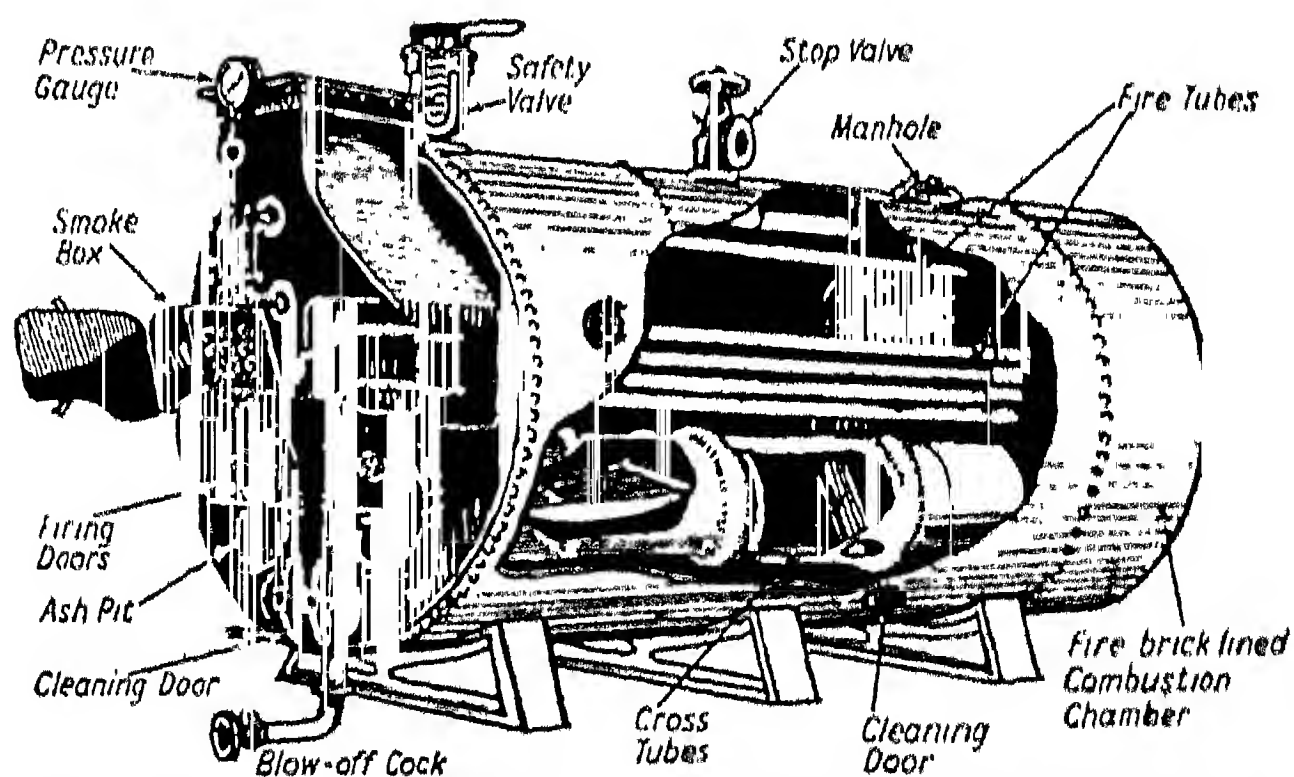
Boiler. Fig. 6 (lower). Typical Cornish boiler, a medium pressure steam boiler. Fig. 7 (upper). Lancashire boiler, similar to the Cornish, but having two flues instead of one. Reproduced from "The Efficient Use of Fuel," by permission of the Controller of H.M. Stationery Office.

the internal flue (Fig. 8), with or without the horizontal fire-tubes.

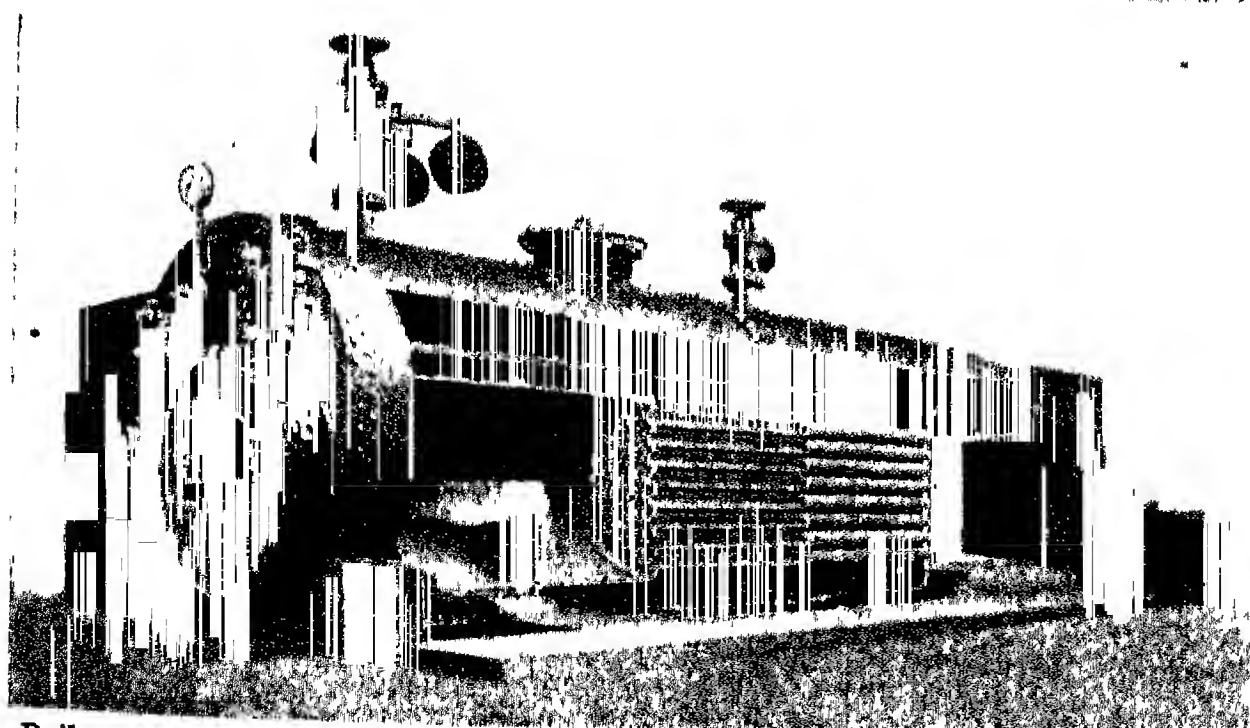
Alternatively, the internal flues may be placed higher in the shell to accommodate banks of smoke-tubes in the lower water space. In a modification of the basic Cornish boiler (Fig. 9), the internal flue terminates behind the fire bridge in a circular tube plate. When brick-set, this boiler would retain the bottom and side flues (Fig. 6); but, in the independent self-contained pattern, the gases pass to a smoke-box behind the "back-end" tube plate and thence to the chimney. Improvements of the original shell boiler along these lines, in conjunction with automatic firing and forced or induced draught, and the use of economisers and superheaters, have led to the successful extraction of the bulk of the usable

heat of normal fuels, and to thermal efficiencies of fully 80 p.c. Cornish boilers are used in a

variety of sizes up to a maximum evaporative rating of about 4,000 lb. of steam per hour at a pressure of 150 lb. The Lancashire pattern may be used for duties up to 12,000 lb./hour and for pressures in excess of 200 lb. gauge in the larger sizes. The inordinate length of the larger sizes of the plain shell boiler, some of which are fully 30 ft. long by 10 ft. diameter, has led to the development of a wide variety of horizontal multi-tubular or "economic" boilers.

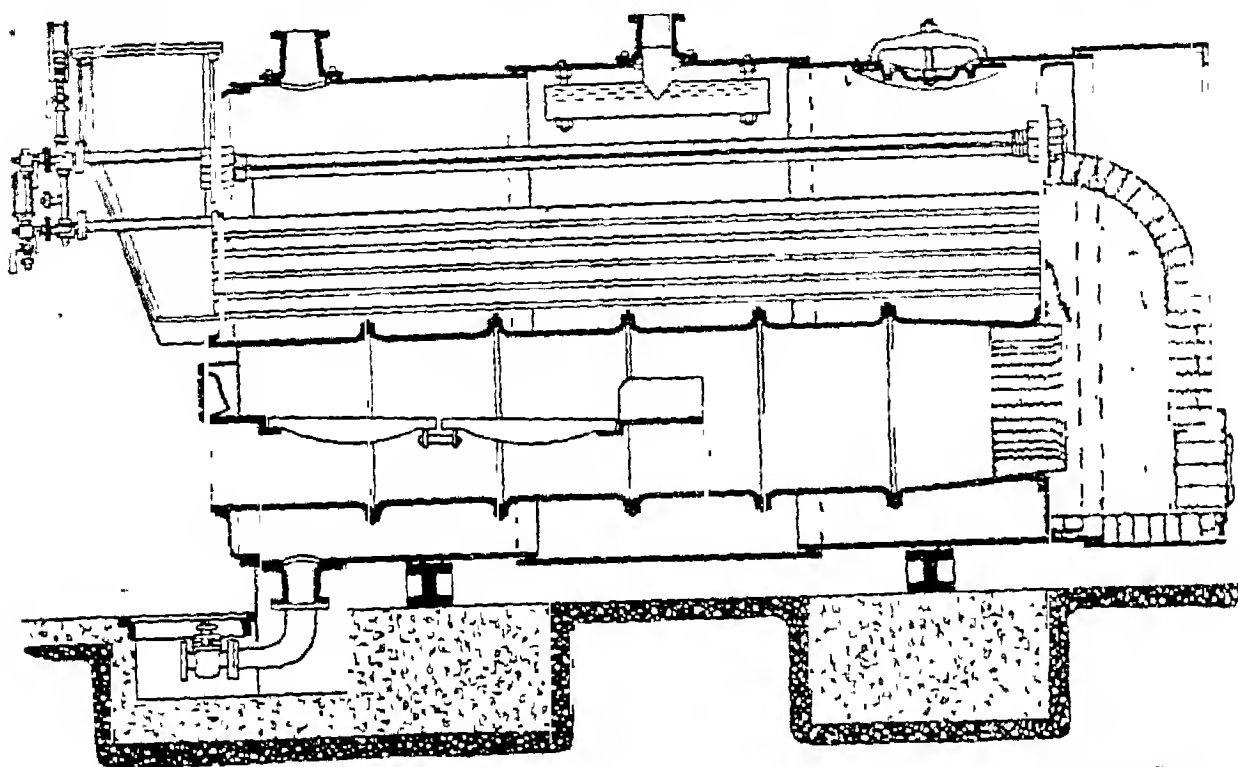


Boiler. Fig. 8. Farratube steam boiler, modification of the Lancashire boiler. Farrar Boiler Works, Ltd.



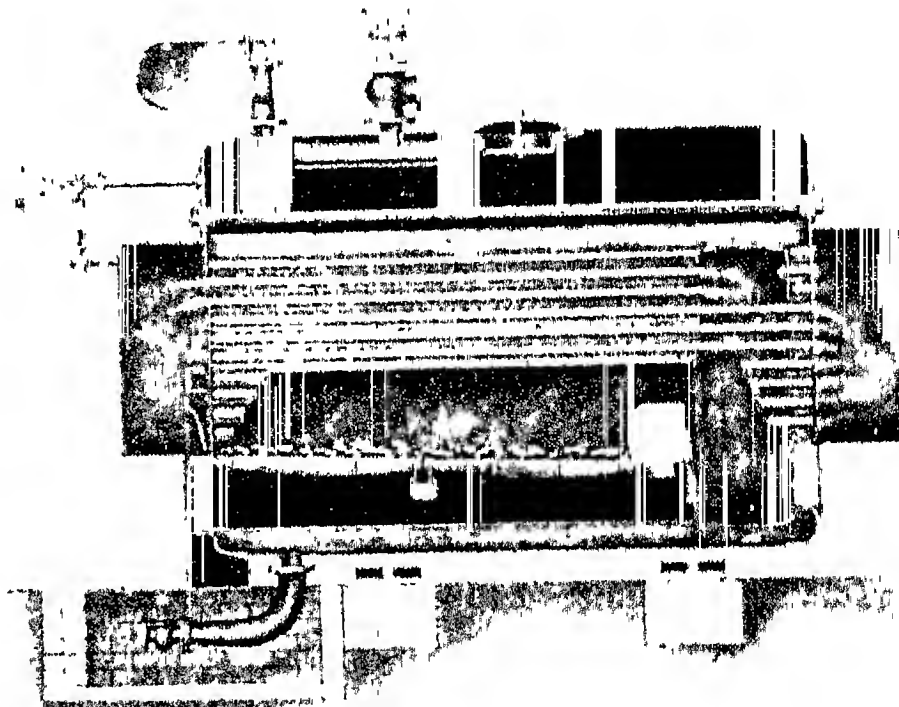
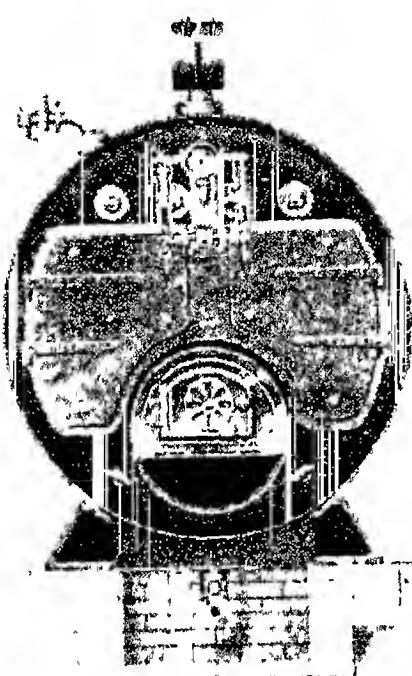
Boiler. Fig. 9. Cornish multi-tubular steam boiler, showing circular tube-plate behind the fire-bridge. This is a modification of the basic Cornish boiler. Cradley Boiler Co., Ltd.

The convective heating surface provided by the fire-tubes promotes quicker steaming; such boilers are little more than half the length of a plain shell boiler serving a similar duty. The two basic designs of the horizontal economic boiler are shown in Figs. 10 and 11. The "dry-back" arrangement of the single-pass boiler (Fig. 10)—the term arises from the brick-lined combustion chamber—may also be applied to a double-return boiler (Fig. 11). Similarly, the "wet-back" or water-jacketed combustion chamber (Fig. 11) may equally well be used when there is only one set of tubes and when the flue

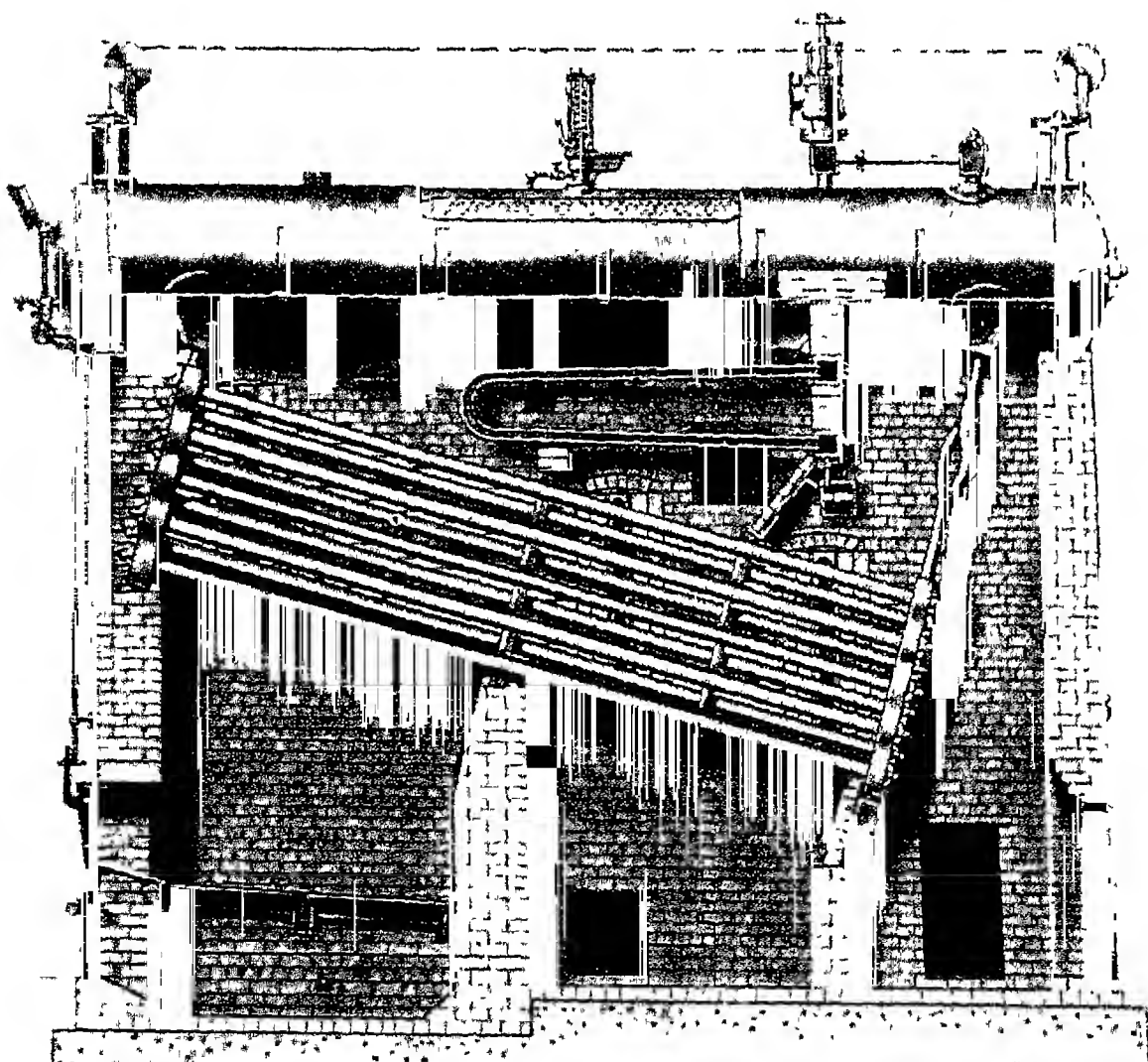


Boiler. Fig. 10. A multi-tubular medium pressure type: single-pass dry-back horizontal economic boiler
Cradley Boiler Co., Ltd.

connexion is at the firing end. The refractory brick lining of the dry-back combustion chamber promotes complete combustion and, therefore, improves efficiency. The unlined chamber of the wet-back design presupposes complete combustion in the internal flue, and provides additional heating surface. The wet-back arrangement further admits of the independent expansion of the two sets of tubes in a double return boiler.



Boiler. Fig. 11. Double-return wet-back (i.e. with water-jacketed combustion chamber) Thermax multi-tubular or economic boiler
Ruston & Hornsby, Ltd.



Boiler. Fig. 12. High pressure boiler for industrial steam generation; it is fitted with a superheater integral with the boiler
Babcock & Wilcox, Ltd.

The internal combustion chambers and flues already illustrated are suited to a wide variety of firing methods, but are ill-adapted to the burning of waste products such as rice and coffee husks, crushed sugar cane (bagasse), and similar refuse. When these have to be used, the boiler is fired externally (under-fired boiler). The plain grate would then be replaced by a larger brick-built combustion chamber of such dimensions as best suit the particular refuse to be burned.

Well-designed multi-tubular boilers normally evaporate 10 lb. of steam per pound of coal, and may be built for pressures up to 300 lb. per sq. inch. The smaller sizes are often hand-fired, but

larger units supplying upwards of 25,000 lb. of steam per hour would have two or more internal furnace tubes, and would usually be mechanically fired. Thermal efficiency normally lies between 75 and 80 p.c., depending on the efficacy of the air and feed-water heaters, and the superheater.

HIGH PRESSURE STEAM BOILERS. The large volumes of steam and the high pressures required by modern power plants and other big installations place the needs of these stations far beyond the upper pressure limits of the shell type of boiler. This leads inevitably to the adoption of boilers of the vertical water-tube pattern, of which there are three general types, namely, the straight tube, the bent tube, and the continuous tube or forced circulation boiler. These are mainly free from the structural limitations of the shell pattern with regard to pressure, and all are designed to generate steam from a relatively small quantity of water.

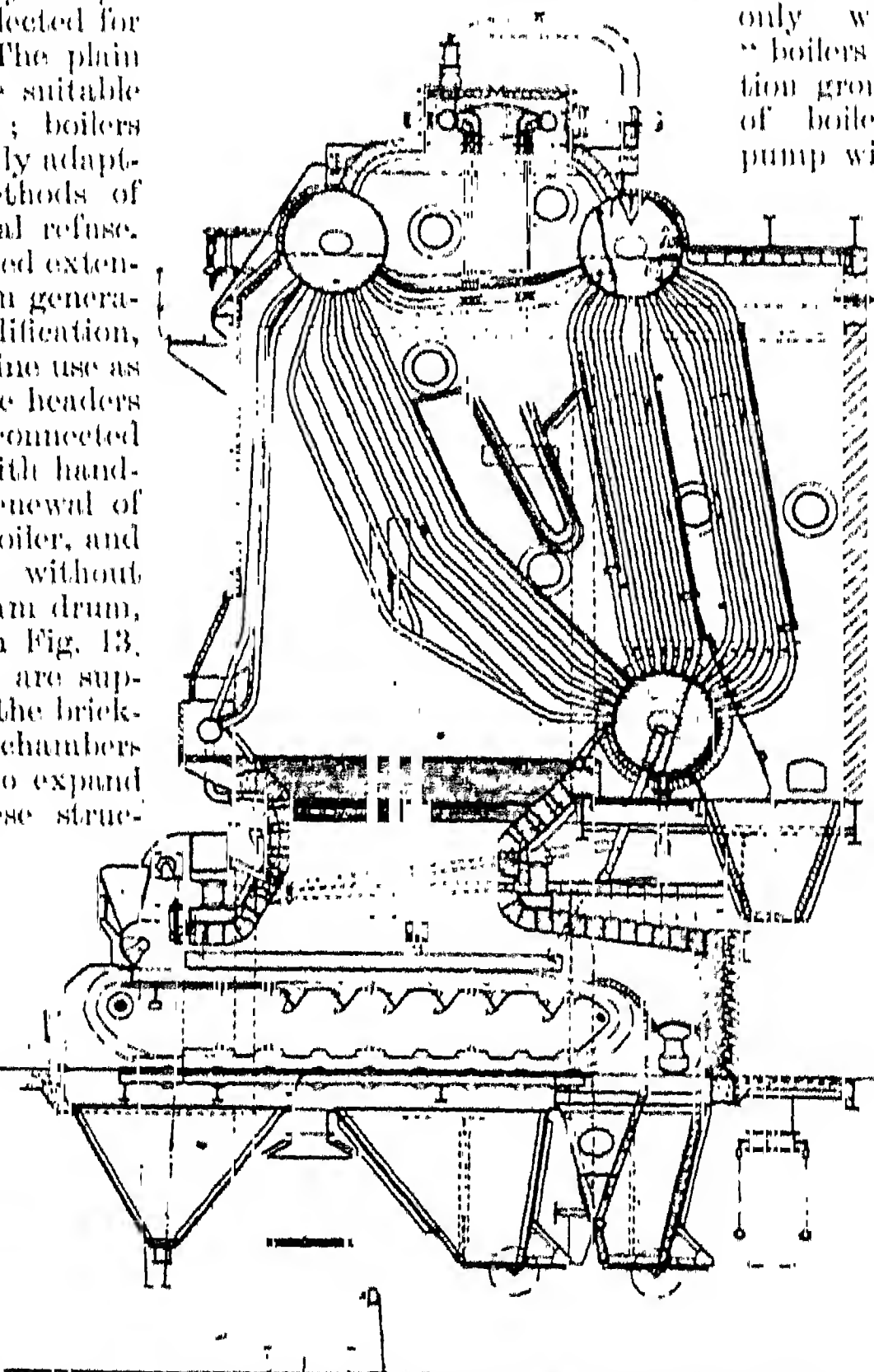


Boiler. Fig. 13. High head boiler with hopper-bottom furnace for pulverised fuel
Babcock & Wilcox, Ltd.

The first of these arrangements—straight tube—is shown in Figs. 12 and 13, comparatively simple examples having been selected for clarity of illustration. The plain grate (Fig. 12) would be suitable for the smaller sizes only; boilers of both patterns are readily adaptable to all modern methods of firing, including industrial refuse. Boilers of this kind are used extensively for industrial steam generation and, with slight modification, are as well suited to marine use as to land installations. The headers to which the tubes are connected (Fig. 12) are provided with hand-holes to facilitate the renewal of tubes from outside the boiler, and to admit of inspection without need of access to the steam drum, as would be necessary in Fig. 13. Boilers of both patterns are supported independently of the brickwork of the combustion chambers and flues, and are free to expand without damage to these structures; the tubes are so baffled as to divert the products of combustion over the whole of the heating surface. A modern development of the basic Babcock boiler is shown in Fig. 13, in which a hopper-bottom furnace having water-cooled walls is adapted to the burning of pulverised coal. Boilers of this kind have been constructed for safety valve loadings of 1,500 lb. per sq. in., and others of this design are regularly used for duties up to

400,000 lb. of steam per hour at gauge pressures of fully 1,000 lb. and final steam temperatures up to 900° F. These boilers are not of unit construction; each is specifically designed for the particular application for which it is to be used, and may therefore incorporate refinements leading to thermal efficiencies of the order of 85 p.c.

The bent tube boiler is not unlike the straight tube boiler of Fig. 13, and is seen (Fig. 14) in conjunction with a chain-grate stoker, also as in the other diagram. The tubes are bent in order that they may enter the drums radially, and also to give greater flexibility in expansion. In addition to the standard "Tri-Drum" illustrated, Stirling boilers are also made with 2, 4, and 5 drums, and are manufactured in sizes ranging from 4,000 to 1,000,000 lb. of water evaporated per hour for all modern steam pressures. In common with other designs, these boilers are suitable for all methods



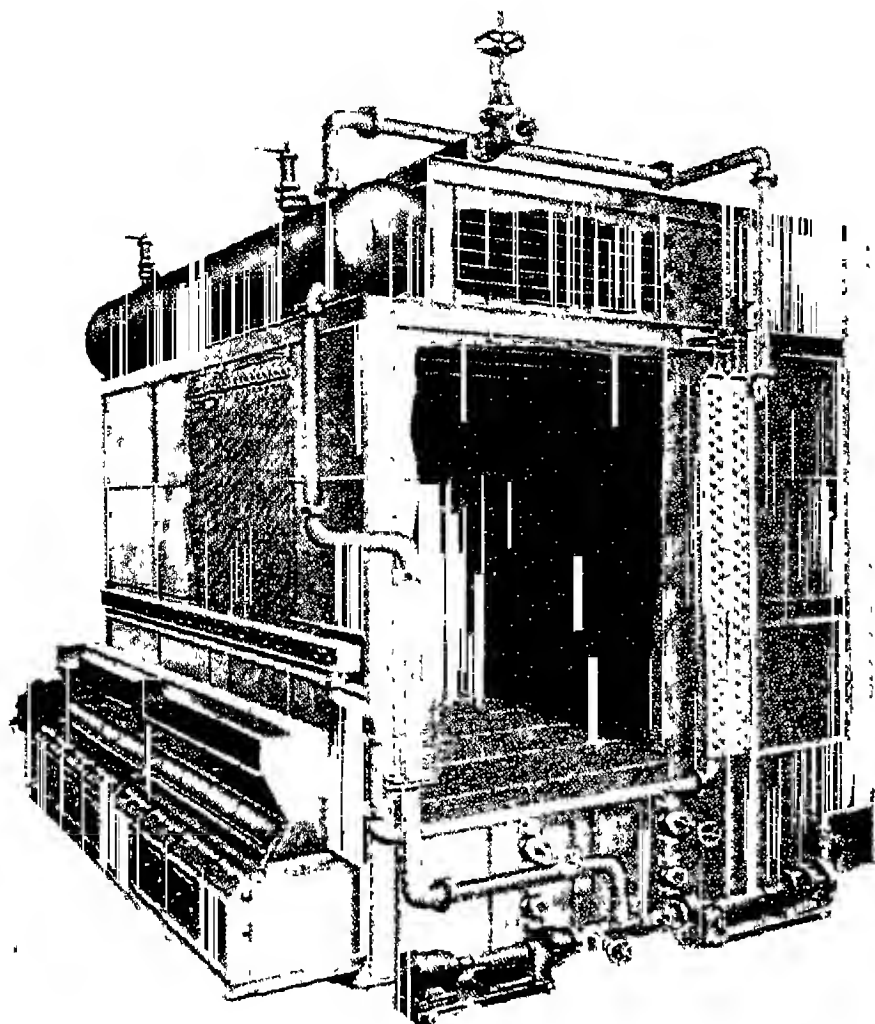
Boiler. Fig. 14. Tri-drum high pressure boiler with front screen and front and rear refractory arch; suitable for all methods of firing
Stirling Boiler Co., Ltd.

of firing, and acceptance and other tests have recorded thermal efficiencies of 87 p.c.

Continuous tube boilers employ forced circulation, and small-bore continuous tubes, but differ slightly in the method of operation. Some types use circulating pumps to withdraw water from the drum, force this through the pipework forming the heating surface, and then return the resulting mixture of steam and water to the drum in which separation takes place, and from which the steam passes into service via the superheater. In certain other systems the boiler feed pump serves as the circulating agent, and is controlled by the steam passing into service to supply just sufficient feed-water to meet the immediate demand. The first portions of these continuous tubes form the economiser or feed water heater, the intermediate lengths, the evaporator, and the final length, the superheater. The absence of drums renders these arrangements the only wholly continuous tube "boilers" in the forced circulation group. In the Loeffler type of boiler a steam circulating pump withdraws saturated steam from a drum, which is

removed from the heating chamber and not subject to external heat, and forces this through radiant and convective superheaters. Some part of this superheated steam then passes into service, but the greater portion is recirculated to the drum where it discharges through open nozzles into the water in order to generate more saturated steam. All such arrangements absorb power continuously. Several are suited to relatively low pressures, but all are well adapted to the higher pressure range; this is particularly true of the Loeffler boiler, which is used almost exclusively for pressures of about 2,000 lb. per sq. in.

Forced circulation boilers are largely of Continental origin and development, as the names of the different systems suggest. Steam generators of this class have been adopted in Britain in successively



Boiler. Fig. 15. La Mont forced circulation steam generator fired by a travelling grate stoker

increasing numbers for power station, industrial, and marine work.

Fig. 15 shows a forced circulation steam generator fitted with chain grate stoker. The right side of the casing has been cut away to show the combustion chamber lined with the evaporating tubes which are fed from the vertical distributor immediately to the right of the large opening. The steam and water mixture generated in this set of tubes is returned to the vertical collector on the right of the distributor, from whence it passes to the drum by way of the overhead pipework. The tubes of the convection heater, seen at the top of the combustion chamber, are a continuation of the tubes of the front water-wall; they are supplied with water from the horizontal distributor immediately above the stoker, and discharge directly into the steam-space of the drum. The economiser, traversed by the feed-water as it passes from pump to drum, is arranged behind the rear wall of the combustion chamber. The tubes of the front water-wall, together with those forming the ceiling of the combustion chamber, constitute one loop of the forced circulation, and combine with a second loop, formed by the tubes lining the two sides and back of the combustion chamber, to complete the evaporating section.

The super-heater tubes, to be seen through the upper opening, are connected to the drum at the inlet ends, and discharge into the steam header shown above the

and so becomes heated in direct proportion to the square of the current consumed, and the resistance of the path.

MERCURY BOILER. Mercury vapour turbines are based on the fact that mercury boils and vaporises at temperatures approx. three times higher than water at any given pressure. The mercury vapour passes from boiler to turbine at 128 lb./sq. in. absolute, and 962° F., and is exhausted at 2.5 lb./sq. in. abs., and 528° F. to a mercury condenser steam boiler where, in giving up its latent heat, it generates steam at 640 lb./sq. in. and 500° F., before the liquid mercury is pumped back to the boiler. This saturated steam is super-heated to 825° F. in coils at the top of the mercury boiler before passing to the turbine. An installation using two 7.5-MW mercury units (boilers and turbines), and one 25-MW steam turbo-generator, has a total thermal efficiency of 36 p.c. The high cost of mercury, and the toxicity of the vapour, have discouraged wider adoption of this type of boiler.

Boiling. Process by which a liquid turns rapidly into a vapour with more or less violent emission of bubbles (ebullition). The temperature of a liquid to which heat is applied will rise till ebullition begins; then (if it is a pure substance)

casing with the main steam valve at its outlet end. Pressures range from 300 lb. to 2,000 lb. per sq. in., and final temperatures up to 960° F.

ELECTRODE BOILER. This consists of a vertical cylinder in which groups of bare electrodes, projecting through top or bottom, are immersed in the water to be heated or evaporated. Current passes from electrode to electrode through the water, which acts as a resistance

the temperature will remain steady until all the liquid is evaporated.

Any liquid confined in a vacuum which it does not entirely fill will evaporate from its free surface until the pressure of the vapour above it reaches a level (the saturation vapour pressure) that at any given temperature is characteristic of the liquid. When a liquid is heated in the open air, the saturation vapour pressure rises until it becomes equal to the external pressure on the surface of the liquid: then boiling begins. The normal boiling point of a liquid is therefore defined as the temperature at which the saturation vapour pressure is equal to one normal atmosphere (760 mm. Hg). Boiling points are commonly measured with an hypsometer.

By reducing or increasing the external pressure on a liquid it can be made to boil at lower or higher temperatures than its normal boiling point. In a pressure cooker the boiling point of water is raised, so that food can be cooked more quickly. On a mountain, the atmospheric pressure is considerably below normal, so that it is often difficult or impossible to cook or make tea in ordinary boiling water. If the boiling point of a liquid under atmospheric pressure is t , its boiling point under a pressure of p mm. Hg (p being less than 760) is given by $t + c(760 - p)(t + 273)$, where c is a constant for the substance: for water $c = .00018$.

The actual process of boiling was first investigated by Shiro Nukiyama in 1934. From his (and subsequent) work it appears that there are three kinds of boiling: (a) nuclear boiling, during which bubbles of vapour form in rapid succession at certain points on the surface from which heat is being transferred to the liquid: the number of such points increases as the temperature of the hot surface increases, and the hotter it becomes the more rapidly heat is transferred to the liquid; (b) transition boiling, during which the bubbles coalesce to form a thin film of vapour which entirely blankets the hot surface, and grows

NORMAL BOILING POINTS IN DEGREES CENTIGRADE

Helium	-269	Ethyl Alcohol ..	78.3
Hydrogen	-253	Benzene	80.2
Nitrogen	-196	Water	100
Oxygen	-183	Glycerine	290
Carbon-dioxide ..	-57.5	Mercury	357
Chlorine	-34.0	Sulphur	445
Ether	34.6	Sodium	878
Acetone	56.5	Gold	2,300
Bromine	58.8	Iron	3,235
Chloroform	61.2	Tungsten	4,830

thicker with increase of temperature so that the hotter the surface becomes the less heat is transferred: from time to time small random explosions of vapour burst from the film and rise to the top of the liquid; (c) film boiling, during which the blanketing film of vapour has reached a steady thickness, large bubbles rise from it gently and regularly with a loud drumming noise, and heat transfer again begins to increase (though somewhat slowly) with increase of temperature. With water the change from nuclear to transitional boiling occurs at about 150° C.; to film boiling at 300° C. The effect of the different kinds of boiling on the rate of heat transfer is important in designing systems for extracting heat from nuclear reactors.

Bois de Boulogne. Park of Paris. It takes its name from Boulogne-sur-Seine; area 2,250 acres. The Seine flows along its S. border. It was originally part of the forest of Rouvray, but was enclosed about 1800. It was given by Napoleon III to the city of Paris in 1853. It contains the racecourses of Auteuil and Longchamps, a fine collection of foreign animals and plants, artificial lakes and waterfalls, restaurants, a château, etc. Various clubs have grounds here.

Boise. City of Idaho, U.S.A., the capital of the state and co. seat of Ada co. It stands on the Boise river, in a goldmining and agricultural district; much produce, especially wool, is marketed. Industries include food processing and furniture making. It has an airport. Natural hot water is used for heating. Boise, originally a fort, in 1864 became a town and capital of Idaho (then a territory). Pop. (1950) 34,393.

Boisgobey, FORTUNÉ CASTILLÉ DU (1824-91). A French author. Born at Granville, Normandy, Sept. 11, 1824, he served in the army pay department in Algiers during 1844-48, and made his first appearance as a feuilletonist by contributing *Deux Comédiens* to *Le Petit Journal* in 1868. From that time until his death, Feb. 26, 1891, he produced a long series of sensational novels of crime, including *L'Homme sans Nom*, 1872; *Le Forçat Colonel*, 1871; *L'As de Coeur*, 1875; *Le Crime de l'Opéra*, 1879; *Le Fils du Plongeur*, 1890.

Bois-le-Duc. French form of 's Hertogenbosch (*q.v.*).

Boissier, MARIE LOUIS ANTOINE GASTON (1823-1908). A French author. Born at Nîmes, Aug. 15, 1823, he early devoted himself to the study of classical history, and

became successively professor of rhetoric at Angoulême, 1846, and of Latin at the Collège de France, 1861. Elected to the French Academy in 1876, he was made its perpetual secretary in 1895. He died in Paris June 10, 1908. With his first books, *Étude sur la Vie et les Ouvrages de M. T. Varron*, 1861, and *Cicéron et ses Amis*, 1865 (Eng. trans. 1897), he proved himself at once a learned and a charming writer. His reputation was enhanced by *L'Opposition sous les Césars*, 1875; *La Religion Romaine d'Auguste aux Antonins*, 1874; *La Fin du Paganisme*, 1874; and *Promenades Archéologiques*, 1880-1886 (Eng. trans. *The Country of Horace and Virgil*, 1896); *L'Afrique Romaine*, 1893; *Tacite*, 1903 (Eng. trans. 1906). Boissier was the author of two fine literary studies, *Madame de Sévigné*, 1887, and *Saint-Simon*, 1892.

Boissy d'Anglas, FRANÇOIS ANTOINE DE (1756-1826). French revolutionary. Born at Saint-



Boissy d'Anglas, French revolutionary

Jean-le-Chambre, Provence, he was elected to the States-General of 1789, and sat in the Convention of 1792, where he joined the centre party. At first a follower of Robespierre, he deserted him in the crisis of 9 Thermidor and was elected a member of the reorganized committee of public safety. As administrator of food supplies he acted with courage, coolly continuing his speech on one occasion when the head of a fellow-deputy was thrust on a pike before his eyes. Suspected of monarchist sympathies, he fled to England, returning during the Consulate to take his seat first in the tribunate and then in the senate. In 1814 he agreed to the abdication of Napoleon and was made a peer, but he supported Napoleon in the Hundred Days and after Waterloo was for a time excluded from the senate. His writings include literary studies of Malesherbes and Guichard. He died Oct. 20, 1826.

Boito, ARRIGO (1842-1918). An Italian composer and poet. Born at Padua, Feb. 24, 1842, he studied music at Milan. He worked on one or two operas, did some journalism in Milan and Paris, and in 1866 fought under Garibaldi against Austria. Having attracted attention by his share in a cantata, *Le*

Sorelle d'Italia, he had produced at Milan in 1868 his long opera *Mefistofele*, which was not a success until played in a shortened form in 1875. He finished another opera, *Nerone* (*Nero*), in 1916, produced by Toscanini at La Scala in 1921.

His longest poem was *Re Orso*, about the Cretan minotaur. He also wrote the libretti for Verdi's operas *Otello* and *Falstaff*. Made a member of the senate in 1912, Boito died at Milan, June 10, 1918.

Bojador. Cape of Rio de Oro, Spanish W. Africa. Situated in lat. 26° 7' N., long. 14° 19' W., it was first doubled by the Portuguese in 1433. Inflowing currents make navigation dangerous.

Bojer, JOHAN (b. 1872). Norwegian dramatist and novelist. Bojer was born at Trondheim, March 6, 1872, and educated at a military school there, and in Paris, Italy, Berlin, and London. He is perhaps better known in Norway for his novels than his plays. Among Bojer's more popular published works are the plays, *A Mother*, and *The Eyes of Love*; and the novels, *The Prisoner Who Sang*, *Folk by the Sea*, *The King's Men*, *Our Kingdom*.

Boka Kotorsko. For this inlet of the Adriatic Sea in Yugoslavia, see under *Kotor*.

Bokhara. Alternative form of Bukhara (*q.v.*), a city of Uzbek S.S.R.

Boknafjord. Large inlet of Rogaland co., Norway, S. of Hardanger Fjord. Its many branches penetrate N., E., and S.E. into the county. Stavanger lies to the S., near its mouth.

Boksburg. Town of the Transvaal, Union of South Africa. It lies at 5,348 ft. above sea level, 14 m. by railway E.S.E. of Johannesburg, and is the centre of an important mining area, with goldmines and also the most productive coalmines in the province near by. It has a fine town hall, a hospital, and a library, as well as a number of schools and churches. It has engineering industries and an oil refinery. Pop. (1951) 64,213.

Boksburg is also a pleasure resort, with boating, bathing, and fishing on Cinderella Lake in the neighbourhood.

Bol, FERDINAND (c. 1610-80). Dutch painter. Born at Dordrecht, he became at Amsterdam in 1640 the pupil of Rembrandt, whose art he endeavoured to emulate. His most celebrated painting is *The Four Regents of the Leper Hospital* (1668), in the town hall at Amsterdam. He is represented

in the National Gallery, London, the Louvre, and other European galleries, and many supposititious "Rembrandts" were probably painted by him. He died at Amsterdam, July 24, 1680.

Bolama OR BOULAM. Former capital of Portuguese Guinea, W. Africa. It stands on Bolama Island, one of the Bissagos group, opposite the Jeba and Grande rivers. It was superseded as capital by Bissau in 1942.

Bolan. Pass on the frontier of Baluchistan, Pakistan, between Sibi and Quetta. It is crossed by the Bolan r., a military road, and a rly. connecting Jacobabad, on the Indus plain, with the Afghan highlands. The Bolan is some 60 m. long, and from an entrance 800 ft. high rises to a height of 5,900 ft. at the exit. The Bolan river is a torrential stream subject to frequent and sudden floods. Bolan is also the name of a sub-division of Baluchistan.

Bolas. Hunting weapon consisting of a variable number of cords or leather thongs joined together at one end, each with a stone attached at the free end. The weapon is thrown at the legs of a running animal; the momentum of the stones causes the thongs to wind round the quarry's legs and entangle them. Its range has become limited to Patagonia and some Eskimo tribes; but the bolas was an important tool of the hand-axe cultures (Acheulian; Chellean).

Bolbec. Town of France, in the dept. of Seine-Maritime. It is on the river Bolbec, 19 m. N.E. of Havre, and has important cotton-spinning and weaving mills. Pop. (1954) 11,716.

Boldrewood, ROLF. Pseudonym of Thomas Alexander Browne (1826-1915), pioneer Australian novelist. Born in London, Aug. 6, 1826, he was taken to Australia, 1830, and was educated at Sydney College. A pioneer squatter, he became a police magistrate and was goldfields commissioner until 1895. His classic tale of bushranging was *Robbery Under Arms*, 1888. He died March 11, 1915.

Bole (Gr. *bōlos*, clod). Highly aluminous and ferruginous tough red clay. Often many feet in thickness, it is occasionally found between successive flows of basaltic lava, and is due to the weathering and decay of the underlying basaltic rock. Such beds of clay are well known in Antrim, the Faroe Islands, Iceland, and other regions of basalt-lavas. They indicate a pause in the volcanic eruptions.

Bolero. National dance of Spain. Introduced in the latter half of the 18th century, it is performed by two persons to the accompaniment of the castanets or guitar. The term is also used of the air of the dance. A well-known composition with this title is by Ravel. The name is also given to a short sleeveless jacket worn by women.

Boleslaus. Name of three kings of Poland. Boleslaus I (d. 1025), called the Great, became ruler of Poland on the death of his father, Mieszko, in 992. After adding Pomerania, with its Baltic coast, and Cracow to his dominions, he was made a king by the emperor Otto III at Gnesen in 1000. By his wars he extended the territories of Poland, leaving it in 1025 bounded by the Bug and the Elbe, and extending S. to the Danube. For a time he was also master of Bohemia. Boleslaus welcomed S. Adalbert, bishop of Prague, and fostered the development of the Church. On S. Adalbert's martyrdom by the Slavs in 997, the king obtained his relics and had them placed in the church at Gnesen. He was succeeded by his son Casimir I.

His grandson, Boleslaus II (1039-81), called the Bold, after many years of war with the Bohemians, was engaged in a struggle with the Polish nobles. He murdered Stanislaus Szczepanowski, bishop of Cracow, and died in exile in Hungary. Boleslaus III, reigned 1102-39, recovered Silesia and reconquered Pomerania.

Boletus. Genus of fungi (Basidiomycetes). The spores are produced on basidia borne in tubes on the underside of a fleshy cap which is supported by a thick central stem. Several species, e.g. *Boletus satanus*, produce unpleasant symptoms if eaten, but are not deadly. *B. satanus* is easily recognized by its large whitish or grey cap tinged with olive green, short swollen stem covered with a network of bright red lines, and by the fact that the flesh turns blue on bruising. *B. edulis* (large brown cap, fawn stem with a network of white lines) and *B. versipellis* (orange-red cap, dirty white stem with dark brown scales in vertical lines) are edible.

Boleyn, ANNE. Second queen of Henry VIII. See Anne Boleyn.

Bolgary (Russian, Bulgarians), BOLGHAR OR BOLGARA. Village of Tartar A.S.S.R. It stands on the Volga, 60 m. S. of Kazan, and occupies the site of the capital of the old Bulgarian kingdom. It was destroyed by the Mongols in 1238 and by Tamerlane in the 14th

century. The ruins of its walls are still extant. An important trading centre between Europe and the East in the early Middle Ages, it did not become Russian until after the 15th century. Many of its antiquities, weapons, utensils, and coins, and inscriptions in Arabic, Armenian, and Tartar, are preserved in the national museums at Leningrad, Moscow, and elsewhere.

Bolgrad. Town of Ukraine S.S.R., in Ismaili region. It stands on Lake Yalpukh, a feeder of the Danube, 26 m. N. of Ismaili. Soap, candles, and pottery are manufactured. Pop. 12,821.

Boli. Town of Asiatic Turkey, in the vilayet of Boli. Standing on the Boli Su, it is S. of the Boli Dagh, and 135 m. E. of Istanbul. It has a trade in timber and makes cotton and leather goods.

Bolingbroke. Name by which Henry of Lancaster (afterwards Henry IV of England) was known, from the place of his birth in Lincolnshire.

Bolingbroke, HENRY ST. JOHN, VISCOUNT (1678-1751). English statesman and writer. The son of Sir Henry St.

John, baronet, he was born at Battersea, Oct. 1, 1678, and educated at Eton. He became M.P. for Wootton Bassett in 1701, and at once his eloquence brought him to the front.

He acted with the Tories, and after three busy years was made secretary at war in 1704. In 1708 he and his close colleague Harley left office, but in 1710 the two returned to power, St. John being secretary of state for foreign affairs. In 1712 he was created Viscount Bolingbroke, and in 1713 concluded the treaty of Utrecht, which was directly advantageous to England.

Peace being restored, the succession to the British throne became a question of first importance. Bolingbroke was in communication with James, the Old Pretender, but his exact aims are still a matter of controversy. The evidence suggests that, although by no means a fervid Jacobite, he was prepared to crown James on Anne's death. Oxford (Harley), from whom he was now parted, left office in July, 1714, and Bolingbroke became chief minister. But his plans were shattered by the sudden death of



Engraving by H. B. Wallis

Queen Anne and by the prompt action of the Whigs. George I was proclaimed king, and Bolingbroke resigned. A little later, learning that Walpole proposed to impeach the English negotiators of the treaty of Utrecht, Bolingbroke fled to France. His attainder quickly followed. He remained in France until he received his pardon in 1723; but through the influence of Walpole he was excluded from the house of lords, and as soon as he was settled in England he devoted himself to attacking that minister. He became the centre of Tory opposition for both men of letters and politicians. His contributions to *The Craftsman* expressed his hostility to Walpole. He was the patron of Pope, who dedicated to him the *Essay on Man*. He died Dec. 12, 1751, and was buried at Batterssea.

Among his literary works are *Letters on the Study and Use of History*; *Letters on the Spirit of Patriotism*; *The Idea of a Patriot King*, which had its share in forming George III's conception of the kingly office. Bolingbroke was gifted, especially as an orator, but was without political principle, and was by temperament an intriguer. *Consult* Lives, J. C. Collins, 1886; A. Hassall, 1889; W. Sichel, 1901-02; Sir Charles Petrie, 1937.

Bolívar. Department in the N. of Colombia. Bounded N.W. by the Caribbean Sea, and E. by the Magdalena river, it is mountainous in the S. but elsewhere is low-lying. The climate is unhealthy. It has deposits of petroleum, gold, coal, and lime. Watered by the Cauca and smaller streams, it has fertile valleys producing tropical fruits, coffee, tobacco, cotton, medicinal plants, and timber. Asses and cattle are reared, turtles caught, and caimans' eggs collected for food. The capital and trading, shipping, and manufacturing centre is Cartagena. Area 23,000 sq. m. Pop. (1951) 665,195.

Bolívar. Smallest prov. of central Ecuador, S. America, capital Guaranda. Part of the central plateau, it is well wooded and well watered, and produces good timber, cinchona, grain, cattle, tobacco, and fruit. Area 1,159 sq. m. Pop. (est. 1955) 122,600.

Bolívar. Largest state of Venezuela, extending from Colombia to the Atlantic. It slopes E. and N. to the Orinoco, by which and its tributaries it is watered. It produces rubber, drugs, coffee, cocoa, cattle, gold, fine cabinet woods, mica, iron, and diamonds. Area

91,868 sq. m. Pop. (1950) 127,436. Ciudad Bolívar, the capital, is an important commercial centre and flourishing Orinoco port.

Bolívar. Silver coin of Venezuela, the official monetary unit; its value in 1954 was Bs. 3.35 to the U.S. \$. It is divided into 100 centimos. The name commemorates Simon Bolívar.

Bolívar, SIMON (1783-1830). South American revolutionary, called the Liberator. Born at Caracas, July 24, 1783, he was educated at Madrid. After studying in Europe, he resided at Caracas, 1801-1804, but on the death of



Simon Bolívar,
The Liberator

his wife again visited Europe. His return to Venezuela in 1809 followed a journey through the U.S.A., and he arrived home determined to make his native country an independent republic.

After the rising of the Venezuelans in 1810 Bolívar was sent on an unsuccessful mission to London, the British government declining to support a revolt against Spain of the Spanish colonies in America. But after a time he renewed the war, defeated the Spaniards near Cúcuta, and in 1813 was proclaimed "Liberator of Venezuela" at Caracas. Beaten in 1814, he

retired to Cartagena, thence to Jamaica and Haiti, rallying the insurgents in Haiti and proclaiming it a republic.

In Aug., 1819, Bolívar decisively defeated the Royalists at Boyacá, and in Dec. of that year the republic of Colombia, consisting of the depts. of Venezuela, Quito, and Cundinamarca, was proclaimed, with Bolívar as president. In Dec., 1824, his forces under General Sucre liberated Peru at Ayacucho, finally overthrowing Spanish power in South America. The southern provinces of Peru formed themselves into a separate state named Bolivia, after the Liberator, and adopted in 1826 a constitution drawn up by him.

He was re-elected president of Colombia in 1826 and 1828 but was attacked by the federalist section of the republicans, who opposed his centralist views. A conspiracy was formed against his life, and in 1829 Venezuela separated from Colombia. Bolívar, driven to resign, laid down his office, retired to Cartagena, Colombia, and died at San Pedro, near Santa Marta, Dec. 10, 1830. His considerable private wealth was spent in the wars of independence. In 1842 his remains were brought from Santa Marta to Caracas, where a public monument to his memory was erected in Plaza Bolívar. *Consult* Lives, P. A. Martin, 1932; Salvador de Madariaga, 1952.

BOLIVIA: REPUBLIC OF THE ANDES

As with the articles on the other countries of S. America, the principal characteristics of the Bolivian republic and its people are described, their history, constitution, industries, and culture. See also under separate headings for particular towns, cities, rivers, etc.

Bolivia is a country of South America. It is bounded N. and E. by Brazil, S. by Paraguay and Argentina, W. by Chile and Peru. It has no coastline. Area 419,470 sq. m. There are four main topographical zones: (i) The Altiplano; (ii) The Yungas; (iii) the Puna; (iv) the lowlands. The Altiplano is a plateau, area 6,500 sq. m., at an average altitude of 12,000 ft. It lies between the Western and Eastern Cordilleras of the Andes. The Western Cordillera, forming the frontier with Chile, includes peaks of more than 21,000 ft., and many active volcanoes; it is for the most part rainless and arid. The Eastern Cordillera, rising in steep escarpments from the Altiplano, falls sharply towards the Amazon basin in the N.E. in thickly forested slopes gouged out by

torrential streams into fertile valleys from 3,000 to 6,500 ft. above sea level; these are the Yungas. South of Cochabamba, the more gradual declivity towards the E. is also deeply eroded by streams which join the Amazon and La Plata basins; this is called the Puna, and its fertile valleys are thickly populated. The rainy forest lands and steamy savannas at the northern foot of the Eastern Cordillera, drained by the Mamoré, Madre de Dios, and Beni rivers; and the drier forests and plains farther S. form the potentially rich but undeveloped lowlands.

Products. The wealth of the Altiplano lies in its minerals. Bolivia is the second most important tin-producing country in the world. The chief sources, nationalised in 1952, are the Llallagua

mines (which belonged to the Patiño interests) from which come 43 p.c. of all Bolivian production; Cerro de Potosí (Hochschild) 25 p.c.; and Animas (Aramayo) 6 p.c. Most of the tin is exported in its crude form for smelting in the U.S.A. and Great Britain. Lead is mined around Potosí and copper in Corocoro. Antimony, wolfram, tungsten, zinc, gold, and silver are found in the low belt of hills near Oruro, but these minerals are worked only when world prices are high enough to defray the costs of production and transport. Minerals account for nearly all Bolivia's exports, two-thirds being tin.

In the south, at Sanandita and Camiri, there are petroleum wells, and a pipeline from Camiri takes oil to the refineries at Cochabamba and Sucre. Production in 1952 was 8,316 million litres, but owing to labour and transport difficulties it was cheaper to use imported petrol on the Altiplano.

In the N. of the arid, wind-swept Altiplano, on the Peruvian frontier, where the 3,200 sq. m. Lake Titicaca modifies the extremes of temperature, and where there is sufficient rainfall for the growing of crops, there are prosperous Indian agricultural settlements growing barley and potatoes, and grazing sheep and llamas. There are also scattered farms along the Desaguadero, which drains Lake Titicaca into the shallow, salt Lake Poopo, and along the small rivers which flow from the Eastern Cordillera into the Altiplano.

Bolivia is virtually self-supporting in barley, oats, rye, lucerne, potatoes, yucca, groundnuts, bananas, and most fruits, and could supply all its own needs for food from the Yungas, the Puna, and the eastern lowlands if it had sufficient resources to build roads, clear rivers, import machinery, and attract immigrants. Coffee grown

in the Yungas is of high quality, and abundant rice could be grown around Santa Cruz; about 90,000 lbs. of cotton is produced, but the capacity of the textile mills at La Paz is 2,000 tons a year. Tobacco, vanilla, and sunflower-seeds are produced for domestic use. Coca, the plant yielding cocaine, is extensively grown in the Yungas by Indians; they use traditional methods in their expert production of the plant, which has a life of 40 years. The crop is lucrative, since from time immemorial the Indian population of the Altiplano has depended on the narcotic effect of chewing the leaves to protect themselves from the rigours of hunger and cold. In the Puna grain and fruit are widely cultivated.

Forest Products

Rubber of high elasticity and good quality grows wild in the Amazonian forests, but its collection over wide areas in thick jungle is economic only at times of world booms or when (as during the Japanese occupation of Malaya and the East Indies in the Second

Great War) supplies of cultivated rubber are inadequate. The same applies to quinine bark.

About 4 p.c. of the country is forested, with an estimated 2,000 different species of hardwood of excellent quality. Lack of skilled foresters and efficient machinery and transport makes it impossible to export this potential wealth.

The cattle of the eastern lowlands are a possible food supply greater than any domestic demand, but owing to lack of cold storage facilities and transport difficulties the bulk of the herds run wild. Small quantities of meat are flown to La Paz or sold on the hoof over the Brazilian and Argentine borders. Trinidad is the only important cattle market. Llamas are used in the Cordilleras as pack-animals and provide wool for homespun cloth, and from the alpaca and rarer vicuña comes fibre for more valuable yarn; export of vicuña yarn is prohibited.

Bolivia has little industry. There is an almost undeveloped potential of 3.6 million kW. of hydro-electric power; there are cotton,



woollen, and rayon mills at La Paz using imported yarns; a cement works near by produced some 38,000 tons in 1952; matches are a state monopoly; edible oils expressed from Brazil nuts, sunflower-seed, and groundnuts supply domestic needs. The manufacture of textiles and food processing form the principal industries. Handicrafts show a high standard of finish and design. Consumer goods account for some 57 p.c. of imports, capital goods for 23 p.c., raw materials for 15 p.c., and fuels for 5 p.c. Wheat, wheat-flour, sugar, and cattle amount to 60 p.c. of food imports.

COMMUNICATIONS. Owing to the extreme difficulties of communication, consumer goods imported through Chilean ports to La Paz, and thence by air to the eastern agricultural districts, are prohibitively costly for the poor Indian farmers; there is no easy way of transporting the food produced in the east to the bulk of the population living on the Altiplano; and the cost of transport from the mines of the Eastern Cordillera to ports on the Pacific is very high.

There are three railways leading through passes in the Western Cordillera to the Pacific: (i) a 61-m. line from La Paz to Guaqui, on Lake Titicaca, connecting by steamer with the Southern rly. of Peru which runs via Arequipa to Mollendo and Matarani; (ii) the 276-m. Arica-La Paz rly. crossing the frontier at Charana; (iii) the 729-m. Antofagasta-La Paz line, crossing the frontier at Ollague. A fourth line, from La Paz to Buenos Aires, runs along a natural escarpment near the foot



Bolivia. A religious procession in the small Indian village of Santa Ana, on the name day of the saint after whom the village is named

of the Eastern Cordillera to enter Argentina at Villazón; the bi-weekly service takes 78 hours; there is also a branch line from Rio Mulatos to Potosí and Sucre. A line opened in 1955 connects Cochabamba with Santa Cruz and Corumbá, in Brazil, whence the line continues to Santos on the Atlantic coast of Brazil. It was constructed, with Brazilian assistance, chiefly to tap the petroleum deposits of southern Bolivia. Another line, to be constructed with Argentine help and also to tap petroleum supplies, was planned between Santa Cruz and Yacuiba.

These railways have served the mining interests rather than those of the general internal economy. Owing to the high costs of construction and upkeep, freight charges are prohibitive for the agriculturists of the Yungas and Puna, and most of their goods still

travel by llama or mule. La Paz and the towns of the Altiplano use imported meat, wheat, rice, sugar, timber, and petrol while home products are unexploited or wasted.

Dangerous Roads

The road between La Paz and the Yungas is subject to landslides and subsidence; it climbs through a 15,000-ft. pass at a gradient of 14,200 ft. in 50 m., and its innumerable hairpin bends are strewn with the debris of vehicles which have come to grief. It is maintained by the revenue from coca. The projected road from Sacata to Montepunco will help to make cattle from the Trinidad area available to the Altiplano; and a new paved highway under construction between Santa Cruz and Cochabamba will connect producing with consuming areas. Even on the Altiplano, the surface of loose shale makes road construction costly and difficult, and the mud roads of the lowlands are periodically obliterated by flooding.

Air transport reaches districts formerly inaccessible; but it is too costly to be a solution to Bolivian transport problems. There are regular services between the larger towns and from La Paz to Chile, Peru, Argentina, and Brazil.

CONSTITUTION. Bolivia's first democratic, idealistic constitution was drafted by Simon Bolivar in 1826. It was modified in 1880 and further revised in 1938 and 1945. Executive power is vested in the president, who is elected every four years and may not succeed himself, though he is eligible to stand again after four years. Congress, which sits at La



Bolivia. Spectators attending a bull-baiting at Cochabamba, capital of Cochabamba department in central Bolivia

Paz, the political capital, consists of a senate, with three members for each of the nine departments elected for six years, one-third retiring every two years; and a chamber of deputies elected every four years, one-half retiring every two years. There is a prefect, appointed by the president, for each department: he exercises political, administrative, and military authority; and delegates, also appointed by the president, for the three *delegaciones* which lie outside the jurisdiction of the departments.

Indian communities are organized in tribes under headmen who often exercise a strong moral influence, although they had no political standing until the electoral reforms of 1952, which abrogated the former provisos of literacy and income, and gave the vote to single citizens, both men and women, of 21, to married citizens of 18. Previously to qualify as a voter a citizen had to be able to sign his (or her) name in Spanish and have an income of not less than 200 bolivianos a year (approximately one U.S. dollar at the official rate of exchange). In 1951 the electoral roll numbered 160,000 (out of a population of more than three million); only 50 p.c. of those eligible actually voted. In 1952 it rose to 2,500,000.

There has been a wide gap between the democratic principles of the constitution and the condition of two-thirds of the people who have lived in serfdom and acute poverty. An ambitious programme of social welfare seeks to redress these anomalies.

Religion and Education

There is religious toleration, but the State supports the R.C. religion which the Indians combine with the picturesque rites of their prehistoric cults. A law of 1932 allowed divorce. The official language is Spanish, but Indian dialects are widely spoken.

EDUCATION. There are seven universities, at Sucre (founded 1624), La Paz, Cochabamba, Potosí, Santa Cruz, Oruro, and Tarija. Primary education is pitifully inadequate. There are schools for the training of teachers, including two for teachers of rural Indians. In the 1955 budget education was the largest single item.

PEOPLE. According to the 1950 census there were 3,019,031 inhabitants (but it is admittedly difficult to register the rural population), 56 p.c. Indian, 30 p.c. cholo (mixed blood), 14 p.c.

white. The distinction is more social than ethnic. The whites are the ruling minority; the cholos are the minor administrative section; the Indians are the labourers. The highest white populations are found at Tarija, Santa Cruz, and Cochabamba; the highest Indian around Lake Titicaca; La Paz is roughly half-and-half. The Indians of the Altiplano, who, apart from the farming communities round Lake Titicaca, work principally in the mines, are Aymara-speaking and descended from pre-Inca stock: they are of good intelligence and mechanical aptitude, reserved, stoic, unambitious, and parochial. In compensation for the scarcity of oxygen at the high altitudes at which they work (La Paz is the highest capital in the world, and Lake Titicaca the highest navigable lake) they have a greater lung capacity and more red blood corpuscles than those living at sea level. Few peoples are capable of such sustained labour on such meagre sustenance.

The lowland Indians are descendants of the Incas and speak the Quechua tongue. They are accustomed to scratch the soil just enough to support their extremely low standard of living; they are not interested in growing a surplus for the use of the inhabitants of the Altiplano. Bolivians have a surprisingly long expectation of life, in spite of their poverty: the census of 1950 showed 1,261 centenarians.

HISTORY. The monolithic gateway of superb construction and masonry which stands at the south end of Lake Titicaca is evidence of a pre-Inca civilization of a high order, for the Quechua-speaking Incas of Cuzco found Aymara-speaking Indians living among the ruins when they conquered the area c. A.D. 1200. The region remained under the Incas until the coming of the Spaniards, who in 1538 founded Sucre (which is still the official, though La Paz is the political, capital). After the discovery of silver at Potosí in 1545 the country assumed great importance for the Conquistadors, who built what are still the chief towns of W. Bolivia. It is said that the mines near Potosí produced \$U.S. 1,000,000,000 worth of silver over a period of 400 years. The country was at first called Charcas, and its capital, Sucre, held jurisdiction over the three great provinces of Buenos Aires and Tucuman (now in Argentina) and Paraguay until

1776, when its influence was reduced to what was more nearly the extent of present-day Bolivia.

Throughout the colonial period Charcas enjoyed great cultural and economic importance. The political, artistic, and religious life of Potosí during the 18th century has been compared with that of the cities of the Italian Renaissance, while Sucre vied with Bogotá as the "Athens of America," and La Paz was supreme in commercial prosperity. It was because of this maturity that revolutionary movements against Spain first began in what became Bolivia.

After many revolts by cholos and Indians during 1661-1770, the University of S. Francis Xavier at Sucre advocated the independence of all the Spanish colonies. In 1822, Bolívar's general, Sucre, with the help of a large British contingent, won the battle of Ayacucho, and on Aug. 25, 1825, Bolívar gave his own name to the country. The first constitution was drawn up in 1826, but Sucre ruled as a dictator for ten years.

Bolivia's decline has been due partly to geographic barriers which have made it difficult, on a basis of llama and mule transport, to occupy and exploit its separate potentially rich areas, and partly to foreign attrition. In the War of the Pacific, 1879-83, it lost the nitrate fields of the Atacama Desert, with its Pacific littoral, to Chile, which built in compensation the railway between Arica and La Paz. Bolivia lost to Brazil by a treaty of 1867 c. 100,000 sq. m. along its N.E. frontier; and again to Brazil, in 1903, ceded Acre territory in return for a Brazilian promise to build the Madeira-Mamoré railway, which never reached its agreed destination of Riberalta. In 1938 Bolivia lost 70 p.c. of Chaco to Paraguay (*see* Chaco War). The economic effects of the Chaco War were in part compensated by the boom in non-ferrous metals during the Second Great War and the Korean War; but the political and moral effects were far-reaching.

Period of Disorders

After 1936 there was a decade of military coups, counter-revolution, and political manoeuvring culminating in a popular rising and the assassination of President Gualberto Villaroel, leader of the National Revolutionary Movement. Thereafter the country was governed by an unstable alliance of centre parties representing the



1. A tin mine, one of the many which make Bolivia the second most important producer of tin in the world. 2. Street clothes market at La Paz. 3. A Chiriguano woman carrying her child in characteristic manner. 4. Herd of llamas, Bolivia's beasts of burden; the

females are used as milch animals. 5. The Gate of the Sun, most famous of the monoliths in the Tiabuanaco district. 6. Aymara Indian woman selling meat. 7. Homes of the Aymara Indians in a mountain village. 8. The Rio Chimore flowing through dense forest

BOLIVIA: DIVERSE SCENES OF TOWN AND COUNTRY LIFE

landed, professional, and official classes. An inconclusive election in 1951 was followed by a military junta, which was opposed by a coalition between the right-wing National Revolutionary Movement and the armed mineworkers under Juan Lechín, the left-wing leader. The regular militia was defeated and a revolutionary govt. was set up under the presidency of Paz Estenssoro in 1952. The new regime nationalised the huge mining concerns of Patiño, Hochschild, and Aramayo, which were responsible for three-quarters of the country's mineral production; whereupon the essential foreign technicians withdrew, with a resulting rise in costs and fall in production. It made suffrage universal, regardless of literacy or income; this involved a shift of voting power from the white minority to the Indian majority. It inaugurated the distribution of large estates to Indian subsistence farmers; and introduced long overdue social services and increased expenditure on education.

CULTURE. Bolivia has a wide variety of native handicrafts, and a wealth of folk lore, but has made little contribution to contemporary Latin-American music or art. Franz Tamayo is the outstanding 20th-century poet, and many novels have been written around the lives of the Indian miners, the agricultural Indians, and the cholos. The cultural supplements and international information of the most important daily newspaper, *La Razon*, were of a high order, but this paper was owned by the big mining interests, and was suppressed when these were nationalised.

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Boliviano. Monetary unit of Bolivia. It is divided into 100 centavos. The official rate of exchange in 1956 for all imports and exports was Bs. 190 to the U.S. \$.

Bolkhov or **BOLOKHOV.** Town of the R.S.F.S.R., in the region of Orel. It stands on the Nugra river, a tributary of the Oka, 36 m. N. of the town of Orel. Well built and surrounded by gardens, it has a cathedral, tanneries, and a trade in hemp, tallow, linseed-oil, soap, hides, and cattle. Fruit and vegetables are grown in the surrounding district. One of the chief

features of the town is a monastery, called Optina Pustyn.

Bollandists. Name given to the body of R.C. scholars responsible for the preparation of *Acta Sanctorum*, or deeds of the Saints. They were Flemish Jesuits named after Jan van Bolland (1596-1665), the first editor. Material had been collected by Herbert Rosweide (1569-1629), the originator of the idea, and on this Bolland, assisted by Godfrey Henschen (1601-81), began to work at Antwerp. The first volumes appeared in 1643; the work was suspended for a time by the Spanish Inquisition, and was frequently obstructed. On the suppression of the Jesuits in 1773 the Bollandists were given a monastery in Brussels, but in 1788 were again checked by cessation of financial assistance from the government. Their library was sold to the abbey of Tongerlo, where up to 1794 one or two more volumes were produced.

The biographies and stories of the saints in the *Acta* follow the calendar, and by 1794 the series, in 53 volumes, had reached the middle of Oct. In 1796 the French Revolutionary armies overran Flanders, and it was not until 1837 that the Bollandists could continue their work. Belgium had proclaimed itself an independent state in 1831, and in 1837 the Belgian government authorised the Jesuits to resume at Brussels; an annual government subsidy was paid to them until 1868. In 1845 the first volume of a second series appeared; this was followed by others. In 1882 a new departure was made, an attempt to bring the work into harmony with modern critical methods. A quarterly journal, the *Analecta Bollandiana*, was issued, and the society became in effect a college for the study of hagiology. The lives of the saints continued to be edited and published, but the members also criticised and catalogued collections of MSS. on the subject.

Bollington. Urban district of Cheshire, England, 3 m. N.E. of Macclesfield. The church of S. John the Baptist is built in the Early English style. Silk and cotton, and rayon, nylon, and other synthetic fabrics, are manufactured, and there are calico printing and paper staining industries. Stone is quarried in the district. Pop. (1951) 5,313.

Boll Weevil or **MEXICAN BOLL WEEVIL** (*Anthonomus grandis*). Beetle pest of cotton. Originally South American, it has spread into the cotton-growing areas of

Mexico and the U.S.A., where it is a serious pest. The beetle, one-third of an inch long, punctures the immature cotton boll, inside which it lays its eggs. The eggs hatch in three days into white, legless larvae which feed inside the boll, becoming fully-grown in four to 12 days. The larvae then pass into the pupa stage from which the weevil emerges. Cotton bolls severely attacked by the weevil rot and fall to the ground. In the U.S.A. the boll weevil annually destroys growing cotton equivalent to many thousands of bales. In combating the weevil it is important to force the cotton plants as quickly as possible through the budding stage, when they are most likely to be attacked. As the boll weevil can live through the winter in the debris left after harvesting, the cotton fields and borders are cleared up in the late autumn. During growth of the cotton crop the weevil can be controlled by spraying with calcium arsenate.

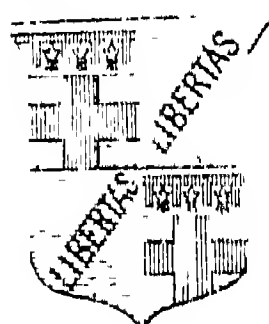
Boll Worm. Caterpillar pest of plants, especially of cotton. It is so called from its attacking the boll or seed-pod. The most destructive, the larva of the moth *Heliothis armiger*, is a serious cotton pest; it also attacks Indian corn, tomatoes, and other crops. The Egyptian boll worm (*Earias insulana*), the Indian boll worm (*E. inculana* and *E. fabia*), and the pink boll worm (*Gelechia gossypiella*) are other examples of these caterpillars.

Bölm Sjö. Lake in Gothland, Sweden, 53 m. N.N.W. of Kristianstad. It is some 20 m. long by 7 m. broad. The island of Bölmso, in the centre of the lake, has interesting antiquities.

Bolo, PAUL (ex. 1918). French adventurer and traitor. Born in Réunion, he came to Marseilles as a boy and then lived by his wits in various parts of the world. In Feb., 1915, having been made pasha by Abbas Hilmi, ex-Khedive of Egypt, he proposed to Abbas that money should be obtained from Germany to finance a press campaign for peace in France. In 1915 and 1916 Bolo travelled in the U.S.A. and it was proved that during that period he received over £300,000 from German sources. Arrested in Paris, Sept. 28, 1917, and brought to trial Feb. 4, 1918, on the charge of obtaining money from the enemy in order to create a pacifist movement in France, he was condemned to death, and shot at Vincennes, April 17, 1918.

Bologna. Prov. of N. Italy, in Emilia-Romagna region. It lies between Modena on the W. and Ravenna on the E. Sloping from the Tuscan Apennines to the valley of the Po, and covering an area of 1,429 sq. m., it is fertile. It was formerly part of the Romagna. Pop. (1951) 768,324.

Bologna (anc. Bononia). City of Italy, capital of the prov. of Bologna. It stands on the rivers



Bologna city arms

Reno and Savena, and on the Aemilian Way, and is a junction 134 m. by rly. S.E. of Milan. Vying in age with Rome, it is noted for its churches, university, feudal palaces and towers, public buildings, arcaded streets and fortifications. Its high brick walls, dating from 1206, are 5½ m. in circumference and pierced by 12 gates; they enclose an irregular hexagon, the centre being the Piazza Maggiore and Neptune Square. The town is intersected by the Reno Canal.

Of its hundred churches, S. Stefano is distinguished by being composed of eight different buildings, the earliest, the former cathedral, dating from the 4th century; the whole being charged with architectural, artistic, and religious interest. Bologna is the seat of an archbishop, its cathedral of S. Peter being modern and rococo in style. S. Petronio, the largest church, though unfinished, dates from 1390; the interior is imposing and rich in works of art. Here Charles V was crowned by the pope, Feb. 24, 1530. S. Francesco, 1236-63, is a fine Gothic church. This was badly damaged in the Second Great War. Of the leaning towers, that of Asinelli, founded 1110, is 320 ft. high and 4 ft. out of the perpendicular; the unfinished Torre Garisenda is 160 ft. high and has a 9 ft. inclination.

The university, founded in the 11th century, was not housed in a special building until 1562. It was noted for teaching jurisprudence in the 11th and anatomy in the 14th century. Famous throughout

Europe in the Middle Ages, 10,000 students, it is said, attended it in 1262. The library is rich in books and MSS. The academy of fine arts has valuable examples of the Bolognese school of painting. Among natives were Guido Reni, Domenichino, the Carracci, Guercino, Francesco Albani, Francia, Galvani, and Rossini. The civic museum, 1712, has an important collection of antiquities. Outside the city lies the 17th-century pilgrimage church of the Madonna di San Luca, which is approached by an arcaded passage 2 m. long, with 666 arches and numerous chapels. The Carthusian monastery founded 1333 is now a cemetery. There is an observatory and a botanic garden which is considered one of the richest in Europe. Bologna is a busy industrial city and is noted for its sausages, macaroni, preserved fruits, liqueurs, perfumery, soap, textiles, candles, and glass. There are printing and lithographic works. Bologna has given eight popes and more than 200 cardinals to the Church. Pop. (1951) 341,072.

First called Felsina, an Etruscan town, Bologna was captured by the Boii and renamed Bononia. It was made a Roman colony 189 B.C., falling successively to the Lombards and the Franks. Charlemagne made it a free city. Sacked by the Hungarians in A.D. 902, it became a republic about 1124, and took part in the Ghibelline feuds, falling in 1506 to the papacy, to which it reverted in 1815 after French occupation. It was besieged and captured by the

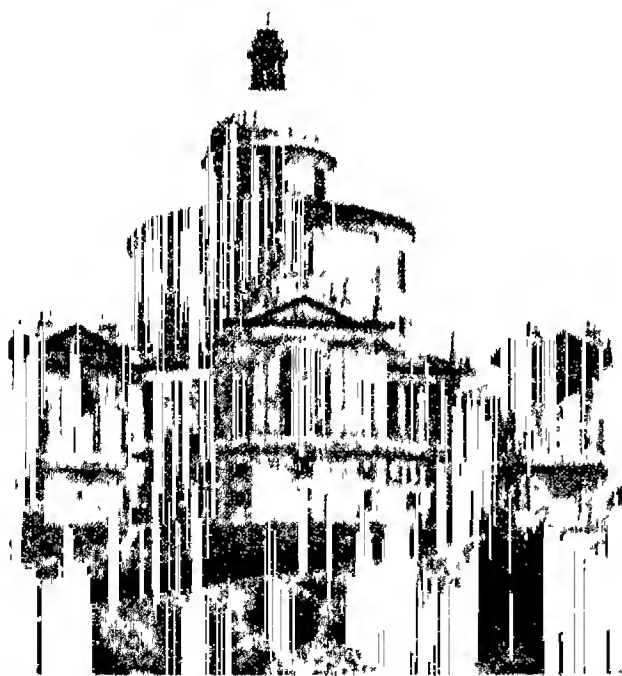
Austrians in 1849. In March, 1860, it was annexed to the kingdom of Italy by the overwhelming vote of its inhabitants. Towards the end of the Second Great War the Germans abandoned the city to Italian patriot forces. Units of the Allied 5th and 8th armies entered Bologna simultaneously on April 21, 1945. The suburbs were considerably damaged, but the centre suffered little.

Bolognian Phosphorus or **BOLOGNIAN STONE.** Luminescent barium sulphide, BaS, first prepared in Bologna in 1602 by a cobbler who heated the local barium sulphate with charcoal—a process still used commercially. After exposure to light, barium sulphide glows in the dark with an orange-coloured luminescence, the exact shade of which varies with the temperature. The phenomenon is fluorescence, not chemiluminescence as in real phosphorus, and seems to depend on the presence of heavy metals as impurities in the barium sulphide.

Bolognini, GIOVANNI BATTISTA (1611-88). Italian painter and etcher. Born at Bologna, he was one of the most distinguished of Guido Reni's disciples. His best paintings were executed for the churches of Santa Maria Nuova, dei Servi, and la Purità, in his native city. As an etcher he was concerned with the reproduction of his master's pictures.

Boloki. Bantu dialect spoken in the Belgian Congo. Typical of the Ngala language, which, owing to the trading activity of the Bangala, has spread in a conventionalised form over North Congo, it is allied to Bobangi, spoken in the same region.

Bolometer (Gr. *bole*, throw, beam; *metron*, measure). Instrument for measuring radiant heat, e.g. in determining the intensity of radiation in different portions of a spectrum. The first bolometer, invented by S. P. Langley in 1881, consisted of two blackened platinum strips, one in each arm of a Wheatstone bridge (see Bridge, Electrical). Intensity of radiation falling upon one of the strips and altering its electrical resistance was measured by



Bologna, Italy. The courtyard and cloisters of the College of Spain. Above, the magnificent church of Madonna di S. Luca

the degree to which the needle of a galvanometer in circuit was deflected. Langley devised the instrument for measuring solar radiation. Since his day it has been developed to give a response to radiations of extremely minute intensity. The principle is that a "black body" absorbs heat radiation and undergoes a rise in temperature; its electrical resistance also increases, so that balance previously established is upset, and the phenomenon can be recorded and made to give a visible indication by the use of a galvanometer (*q.v.*).

Bolor-Tagh OR BELUR-TAGH. Mt. chain of central Asia. Now known as the Kizil Yart, between Russian and Chinese Turkistan, it forms part of the Pamirs, and unites with the Tian-shan Mts. in the N. and the Kiven-lun Mts. in the S. Its general elevation is from 16,000 ft. to 20,000 ft., Mus-tagh-ata attaining 25,760 ft.

Bolsena (anc. Lacus Volsinien-sis). Lake of Italy, in the prov. of Viterbo, 11 m. N.W. of Viterbo. The crater of an extinct volcano, 995 ft. high, it is 8 m. long by 7 m. broad, 480 ft. deep, and has an area of 44 sq. m. It contains the islands of Bisentina and Martana, and discharges its waters by the Marta river into the Mediterranean.

Bolsena (anc. Volsinii). Town of Italy, in Viterbo prov., on the N.E. shore of the lake of Bolsena, 9 m. S.W. of Orvieto. One of the 12 Etruscan cities, it has remains of the ancient and many of the Latin town. Pop. (1951) 4,263. Its church was the scene of the Miracle of Bolsena, 1263, commemorated in the Corpus Christi festival, in Raphael's fresco in the Vatican, and in the founding of Orvieto cathedral. This miracle was attributed to the incredulity of a priest about the doctrine of transubstantiation. Its truth, so it was said, was proved to him when drops of blood appeared on the Host he was consecrating.

Bolshevik (Russ. *bol'she*, more). Russian political label, dating from 1903. In that year the exiled Russian social democratic (socialist) party transferred its second congress from Brussels (where it had been stopped by police action) to London, and important differences in doctrine and policy emerged. One faction, led by Martov, advocated compromise and cooperation with liberals and other moderates in order eventually to overthrow tsardom. The other, led by Lenin, urged a purely proletarian revo-

lution, the putting into practice of the doctrine of Karl Marx, entailing forcible seizure by the workers of the control of all production and the destruction of the capitalist regime in favour of a communal order run by workers in their own interests. Lenin's followers being in the majority (25 votes to 23), they were thenceforward known as the Bolsheviks, the less extreme faction being called Mensheviks. The latter withdrew from the party, and by 1905 each faction had its own organization. For the failure of the unsuccessful revolution of that year each blamed the other.

The Mensheviks cooperated with the more moderate parties, including the cadets or intellectual socialists, who were satisfied with gradual reform within the existing constitution. It was the cadets, under Kerensky, who supplanted the tsar in March, 1917. But the vacillations of their provisional government made comparatively simple the revolution of Oct. (O.S.), 1917, by which Lenin and the Bolsheviks came to power. With the help of the revolutionary Red Army, founded and led by Trotsky, they crushed all opposition by force, became the sole party in the state, and established a dictatorship of the proletariat. They waged ruthless war upon capitalism and thereby upon the dependent bourgeoisie; and, as in all war, much guiltless blood was shed and there was much to horrify and disgust the outer world. So the word bolshevism impressed itself upon all civilized nations, though for more than a decade its exact meaning was obscured by its over-use as a "bogy" word, *e.g.* by Hitler in his speeches. It is not synonymous with communism, but rather the method by which a particular communistic state was established. Except historically, the terms Bolshevik and Bolshevism passed out of use after the Second Great War. Consult *The Practice and Theory of Bolshevism*, B. Russell, 2nd ed., 1949. See Russia, History.

Bolsover. Urban dist. and parish of Derbyshire, England. It stands 6 m. E. of Chesterfield, and is served by rly. It has a Norman church and ruins of a castle. A coal-mining centre, inhabited chiefly by miners and their families, it gives its name to a co. constituency. Pop. (1951) 10,815.

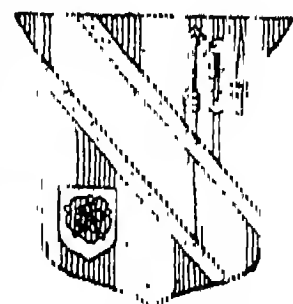
Bolster. Word with various meanings. (1) A head rest, for use when reclining, consisting of a long cushion stuffed with down,

feathers, hair, etc. (2) Transverse member placed across the main underframe of a locomotive tender on which part of the weight of the vehicle rests, and by which it is transferred to the truck or bogie and thence to the wheels. (3) A block upon which metal is supported during punching. (4) The shoulder of a knife, chisel, etc., at the junction of the tang with the blade. (5) A term used in connexion with parts of pianos, fittings for ships, saddlery, etc.

Bolt. Implement of which there are two important classes. (1) Those used for fastening doors, gates, etc. (2) Those in common use by engineers and others for securing together the component parts of machines and other objects. The first class comprises a sliding member, commonly of metal, which engages a socket fixed to a member other than that which carries the bolt. The second class comprises a rod of metal usually provided with a head which may be engaged by a spanner, and having a screwed end for the reception of a nut.

Bolt Head. Headland on the S. coast of Devon, England. It lies W. of the Salcombe estuary, at an alt. of 433 ft. In 1928 the National Trust acquired 580 acres.

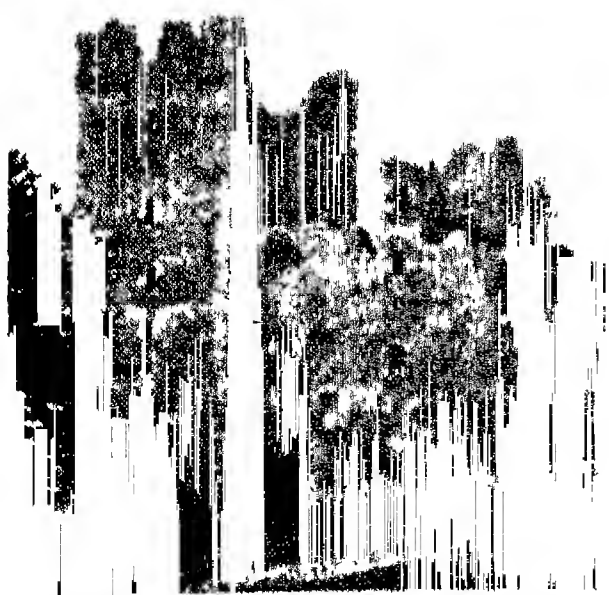
Bolton. Co. bor. and cotton making town of Lancashire, England. It is 196 m. by railway N.W. of London.



Bolton arms

Bolton, one of the oldest and most important centres of the cotton industry, was for centuries famous for its woollen goods. Its wool industry owed much to the Flemish settlers of the 14th century, and to later French immigrants. From the mid-18th century cotton replaced wool as Bolton's chief manufacture, and here were adopted the spinning frame and mule, the respective inventions of Richard Arkwright, a resident, and of Samuel Crompton, a native. Their introduction led to the building of many factories and consequent advance in the output of cotton manufactures. In addition to the manufacture of muslins, fine calicoes, dimities, quiltings, etc., Bolton has large dyeworks, bleaching and paper mills, foundries, and chemical, steel, and iron works. Coal is worked in the vicinity.

Although actually an old town, Bolton presents quite a modern appearance, most of its buildings



Bolton Castle. The handsome remains of this 14th-century Yorkshire stronghold

being of 19th- and 20th-century construction. They include a handsome town hall with civic centre, art and natural history museums, the market hall, and several public libraries. The grammar school was founded in 1524; the technical college was established by the corporation. The famous football team Bolton Wanderers was founded 1874 as the Christ Church Club. On its ground at Bolton on March 9, 1946, occurred the worst recorded disaster connected with football in the U.K., when 33 spectators were crushed to death after the breaking of a barrier.

Among the undertakings developed by the town were the water-works, acquired in 1847, gas and electric works, transport, markets, libraries, abattoirs, hospitals, baths, parks, and playing fields. Bolton was incorporated in 1838, and became a co. bor. 50 years later. In 1832 constituted a parl. bor., under the 1948 redistribution Bolton became two bor. constituencies. Pop. (1951) 167,167.

Bolton Abbey. Parish and village in the W. Riding of Yorkshire, England, 22 m. N.W. of Leeds. The "abbey" from which the village is named was actually a priory of Augustinian canons, founded at Embsay in 1121 and transferred to its present site in 1150. The ruins, beautifully situated beside the river Wharfe, include the nave, used as the parish church, and remains of the choir and transepts. The gatehouse is embodied in Bolton Hall, a residence of the duke of Devonshire.

The priory was painted by Turner and described in poetry by Wordsworth. There are memorials to Lord Frederick Cavendish, murdered in Dublin 1882. The surrounding woods and grouse moors are famous; the Strid, where the river drives dangerously between rocks a few feet apart, is half a mile upstream.

Bolton Castle. Stronghold in the N. Riding of Yorkshire, England, 5 m. W.N.W. of Leyburn in Wensleydale. A late 14th-century castle, it belonged to the Scropes until the mid-17th century. Mary Queen of Scots spent some time there as a prisoner in the care of Henry, Lord Scrope (warden of the Western Marches 1562-92) after her flight to England in 1568.

Bolu. Town of Asiatic Turkey, in the vilayet of Bolu. Standing on the river Bol, 135 m. E. of Istanbul, it has an extensive trade in timber and manufactures cotton and leather. To the E. are the ruins of Bithynium, and to the S. hot medicinal springs. Pop. (1950) 7,927. The vilayet is thickly forested. Pop. (1950) 306,100. The name is a corruption of the Gr. *polis*, city.

Bolyai, JANUS (1802-1860). Hungarian mathematician who shares with N. I. Lobachevski (1793-1856) the credit for describing the first non-Euclidean geometry. He was born Dec. 15, 1802, at Kolozsvár (Cluj). His father Farkas Bolyai (1775-1851) was professor of mathematics, physics, and chemistry at Marosvásárhely, and it was as an appendix to the father's textbook of mathematics that the son published in 1833 his description of a geometry in which Euclid's parallel axiom was false though the remaining Euclidean axioms were verified. The demonstration of the independence of the parallel axiom inaugurated modern geometry. Janus Bolyai was an officer of engineers in the Austrian army. He died Jan. 27, 1860, at Marosvásárhely.

Bolzano (Ger. Bozen). Town of Italy, in Trentino-Alto Adige region, capital of Bolzano prov. It lies at a height of 875 ft. in a picturesque position at the confluence of the Isarco and the Talvera, 35 m. N.N.E. of Trent by the Brenner rly. Its ancient houses and arcaded streets, Tyrolean in style, were badly damaged owing to aerial bombardment of the Brenner rly. by the Allies during the Second Great War. The cathedral received direct hits; the old parish church of S. Nicholas was destroyed; only the walls of the left aisle of the Dominican church remained standing. A Franciscan monastery escaped with superficial damage. At Bolzano is a monument to the poet Walter von der Vogelweide. Pop. (1951) 72,425.

Though the Italian element is increasing in the town, Bolzano and its province are inhabited by a German-speaking population. The

province is mountainous, and includes most of the celebrated peaks of the Dolomites. The tourist industry, fruit-growing, cattle-breeding, and the production of timber are the chief occupations; hydro-electric power is developed. Area, 2,831 sq. m. Pop. (1951) 341,072.

Bolzano, BERNHARD (1781-1848). Austrian philosopher and mathematician. Born in Prague, Oct. 5, 1781, he was educated at Prague University and was appointed to a new chair of the philosophy of religion there in 1805. He was ordained priest a few months later and deposed from the chair for heterodox views in 1819. He died in Prague Dec. 18, 1848.

Bolzano published five mathematical works during 1805-19; but his most famous work, *Paradoxien des Unendlichen* (paradoxes of the infinite) was published after his death. He contributed profoundly to the logical foundations of mathematics, criticising the current heuristic approach and insisting on precise definitions and statements.

Boma or M'BOMA. Oldest European settlement in, and former capital of, the Belgian Congo. Situated on the N. bank of the Congo estuary and connected by rly. with Chéla (or Tshela), 87 m. N., Boma carries on a large export trade in bananas, timber, and palm products.

Bomb. In geology, a volcanic bomb is a mass of lava explosively ejected from a volcanic vent, and cooled sufficiently in its passage through the air to retain the spheroidal or ellipsoidal form imparted to it.

Bomb (Lat. *bombarda*, a catapult). The *bombarda* was a catapult used by the Romans for throwing stones against the walls of besieged cities. After the invention of gunpowder, the name bomb was given to a hollow iron ball filled with explosives which, discharged from a cannon, exploded when it hit the target. Later the military bomb developed into the artillery shell, and the term bomb was applied to explosive missiles thrown by hand, or to the ammunition fired from mortars. The name was also used for the containers of explosives used by assassins to kill political enemies. Sometimes this hand-thrown missile had a fuse which could be set to explode at a certain time and was called a time-bomb.

The term "bomb" has come to be restricted to a pear-shaped or a cylinder-shaped container filled

with explosives and dropped from an aircraft. This differs from a shell in that it has no propelling charge, and must be dropped on its target. The so-called Flying Bomb (*q.v.*) and rocket bomb (*see* Rocket) are not true bombs, because the first was driven by an engine and the second is simply a rocket with an explosive head.

Bombs were first dropped from aircraft in the Balkan War of 1912 and consisted of grenades thrown over-side by the pilot. Early in the First Great War the Royal Naval Air Service used bombs made from 6-inch shells fitted with vanes on the ends and contact fuses in the nose. The shells were carried on racks underneath the aircraft and were released when the pilot pulled a lever; the vanes acted as a tail and made certain that the "bombs" fell straight on to the target, while the contact fuse exploded the shell on impact.

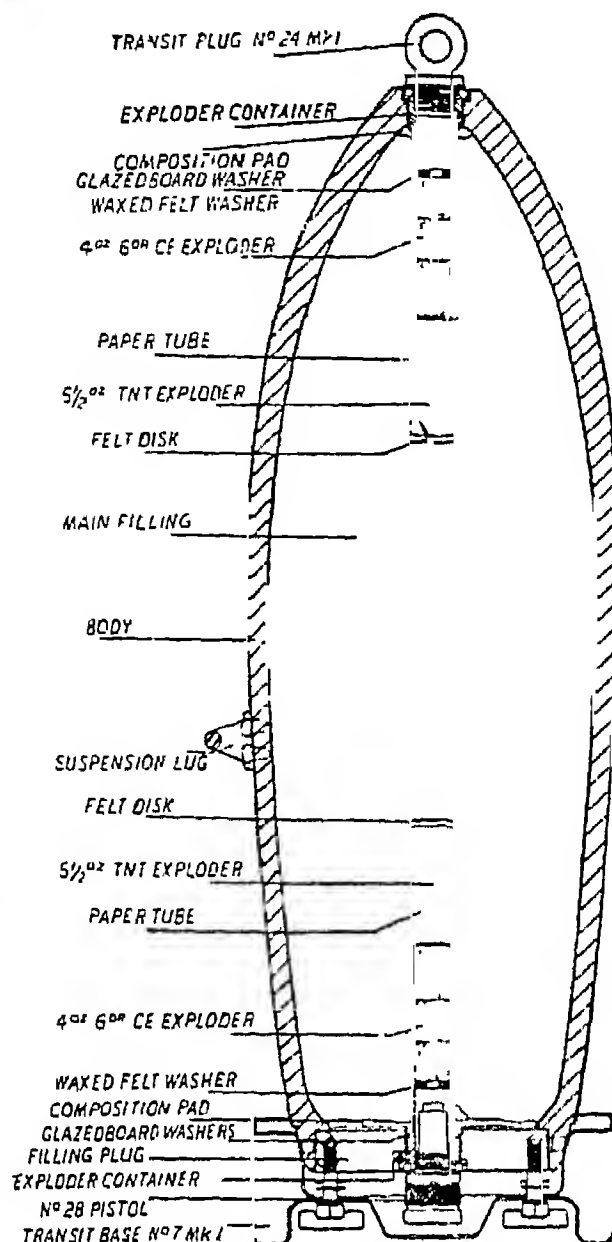
Most of the bombs used by the Royal Flying Corps at that time were hand grenades dropped over the side of the aircraft and steadied in their fall to the ground by strips of tape attached to their ends. A few incendiary or fire bombs were also used, consisting of tins of petrol which burst into flames when they reached the ground.

About 1916 the Royal Flying Corps began developing bombs specially designed for use from aircraft. The shape and methods of fusing H.E. bombs thereafter altered very little, but size and destructive power increased enormously, and aiming became a matter of mathematical accuracy.

Types of Fuse

Aerial bombs are fused to explode either when they hit the target, or after they have punched a hole through the target (armour-piercing bombs) or some time after they have landed on the ground (delayed-action bombs or time-bombs). In some the fuse consists of tubes of chemicals which break when the bomb hits the ground and, mixing together, cause a small explosion sufficient to detonate the main charge in the bomb. In other fuses, a main charge is exploded by a percussion cap in the nose of the bomb. A delayed-action bomb has a clock-work fuse which is wound up and set to go off at a certain time.

No fuse becomes active until the bomb leaves the aircraft. At its fin or tail end there is a small propeller fixed on the end of a spiral rod. During the bomb's fall to the ground, the upward rush of



Bomb. Sectional diagram showing construction of 250-lb. and 500-lb. general-purpose bombs used during the First Great War

air causes the propeller to revolve and pull the spiral upwards: as the spiral rises from the tail of the bomb it pulls a trigger fixed to its lower end and sets the fuse.

Although a bomb weighing 3,000 lb. was designed in 1918, the largest bomb actually used in the First Great War weighed 1,800 lb. and was 15 ft. long. The size of practical bombs was then limited by the difficulty of aiming them accurately. Factors to be considered in accurate bomb-aiming are the speed of the bomber, the speed of the target when it is a moving one (*e.g.* a ship or a train), the speed of the wind, and the height at which the attacking aircraft is flying.

When a bomb is released from an aircraft, it begins its fall forward at about the same speed as the bomber; it must therefore be released before the aircraft passes over the target. The distance from the target at which the bomb must be released if it is to score a hit depends on the height and speed of the bomber. A high-speed aircraft flying at 300 m.p.h. at a height of 10,000 ft. must drop its bombs at a point several miles from the target.

Shortly before the Second Great War bomb-sights were introduced which automatically calculated the bomber's speed and height, the

speed of the wind, and the speed (if moving) of the target. The calculations appeared visually on a dial, and when the target was aligned with the sight the bomb was electrically released from the aircraft. An aircraft bombing visually must fly absolutely level and steady at the moment of releasing its bomb.

Towards the end of the Second Great War sights were introduced that made it possible to bomb from very great heights targets hidden by cloud or fog. Most of these sights depended on radar and showed on a screen, rather like that of a television receiver, the shape of the ground and the objects on it beneath the aircraft. When the image of the target appeared on the screen at the moment when the bomb-sight had given the correct calculations of aircraft altitude and speed, wind speed, etc., the bombs were released although the actual target was invisible to the bomb-aimer.

To bomb accurately without the aid of elaborate instruments, particularly when attacking airfields, troop convoys, or ships, and also to distract the aim of anti-aircraft guns, dive-bombing was introduced by the Germans and later adopted by other countries. Dive-bombing consisted of putting the bomber into a dive, so that it was, in effect, aimed at the target. The bombs were released at the end of the dive, just as the bomber flattened out to climb again.

H.E. Bombs of 1939-45

At the outbreak of the Second Great War the heaviest bomb used by the R.A.F. was the 500-lb. high explosive, which was nearly 6 ft. long and 13 ins. in diameter. As the war continued bombs became larger, *e.g.*, the 2,000-lb. "cookie"; the 4,000-lb. "block-buster" (which contained 3,362 lb. of H.E.); the 8,000-pounder; the 12,000-pounder (which was a combination of three 4,000-pounders joined together, and was 17 ft. long and 3 ft. in diameter). These four bombs were in the form of unstreamlined canisters, as the area against which they were to be used was such that it was not important for them to fall direct on any particular part of a target.

Another 12,000-lb. bomb, the "tallboy," had the usual bomb shape and was fitted with special fins which caused spinning during the fall and thus made the aim more accurate. It had an armour-piercing nose and was designed to

penetrate the thick steel or concrete roofs of the German submarine pens in France (see illus. in page 202). The largest bomb used by the R.A.F. in the Second Great War was the 22,000-lb. armour-piercing "grand slam," which was 25 ft. 5 ins. long and 3 ft. 10 ins. in diameter.

There were also bombs designed for special purposes. Infantry were attacked with 20-lb. fragmentation bombs which were dropped in containers holding 26; when the container was exploded by a time fuse, the individual bombs descended by parachute to burst a few feet above the ground. Depth charges for use against submarines were 600-lb. bombs fused to burst under water. Marker bombs, which released flares, were used to light up targets for attack by H.E. bombs.

One of the most destructive bombs of the Second Great War was the incendiary. This consisted of a thin tube of magnesium alloy filled with thermite (aluminium iron oxide). In its nose was a pin which, upon contact, struck a percussion cap and fired the thermite. Thermite burns at a temperature of 3,000° C., and in the incendiary bomb ignited the magnesium case which burnt with such an intense heat that anything near it caught fire. British incendiary bombs weighed 10 lb. and were dropped in containers holding 100. Some distance from the ground the container opened and the individual bombs fell over a wide area. Another type of incendiary bomb consisted of a case filled with a partly liquid mixture of petrol and napalm. When the bomb made impact the mixture caught fire and spattered over a wide area, and anything upon which pieces of paste fell ignited; approx. 50 p.c. of the bombs dropped on Germany by the R.A.F. in the Second Great War were incendiaries, which on occasions comprised 80 p.c. of a bomber's load. During the Allied air raids on Japan more than 100,000 tons of incendiaries destroyed some 150 sq. m. of Japanese industrial areas. In a single raid on March 9, 1945, 1,000 tons of incendiaries razed 15 sq. m. of Tokyo. See also Atomic Weapons; Guided Missiles.

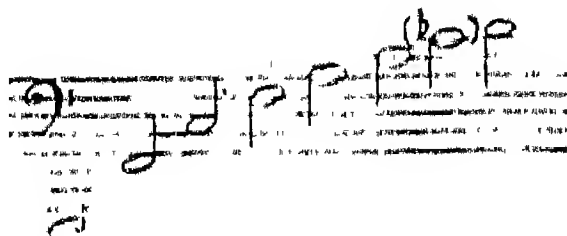
Bomba (Ital., bomb). Nick-name given to Ferdinand II, king of the Two Sicilies, because during the rising of 1849 he was responsible for the bombardment of Palermo and Messina, cities of his own kingdom.

In 1860 his son Francis II bombarded Palermo and was nicknamed Bombalino; Francis lost the kingdom in the same year.

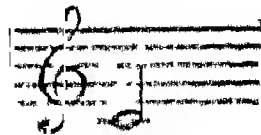
Bombardier. Lowest rank of n.c.o. in the Royal Artillery, equivalent to corporal in the infantry. He is so called because in former times he handled the bombard, a small cannon. In the U.S. air force a bomb-aimer is called bombardier.

Bombardier Beetle (*Brachinus*). Name popularly given to several species of beetles belonging to the family Carabidae, the common European form being *Brachinus crepitans*. These beetles are provided with anal glands secreting an acrid volatile fluid which can be ejected with some force against an enemy.

Bombardon. Brass instrument of bass compass used in military and brass bands. One of the Saxhorn family of instruments with wide conical bore, it is commonly used in three pitches, F, E flat, and low B flat. It possesses an open notes the usual Harmonic Scale, the instrument in F giving the following series:



The other bombardons have lower ranges in proportion. The intervening notes are supplied by three (or four) pistons as in other brass instruments. (See Piston.) Music for the bombardon is written (a) with the bass clef, as a non-transposing instrument, i.e. the actual sounds are given; or (b) with the treble clef, as a transposing instrument, when C as shown here represents the second note of the above series regardless of pitch, and the copy is headed bombardon in E flat, or bombardon in BB flat. This plan is mainly used in amateur brass bands, in which players and instruments alike are more or less interchangeable. The bombardon exists in two types, a long form and a circular form, sometimes called a helicon (*q.v.*), carried on the player's shoulder.



Bombast (late Lat. *bombax*, cotton). Padding for clothes, usually of cotton. The term is given to any soft, spongy material used for wadding; also to seed hair fibres obtained from the cotton-tree plant (*bombax*). In the reigns

of Elizabeth I and James I bombasted doublets, termed pease-cod-bellied doublets, were the vogue, and the trunk hose then worn were similarly stuffed, so that they resembled the enormous farthingales of women. Rags, tow, hair, and even bran were substituted for cotton. The word is used figuratively to describe inflated language.

Bombay. Largest state of the Republic of India. It lies in the west, with a long coastline on the Arabian Sea, and is bounded on the north by West Pakistan and the Indian states of Rajasthan and Madhya Union, on the east by Madhya Union, and on the south-east by Andhra Union, Mysore, and Goa (Portuguese). Area 188,240 sq. m. Pop. (est.) 48,000,000.

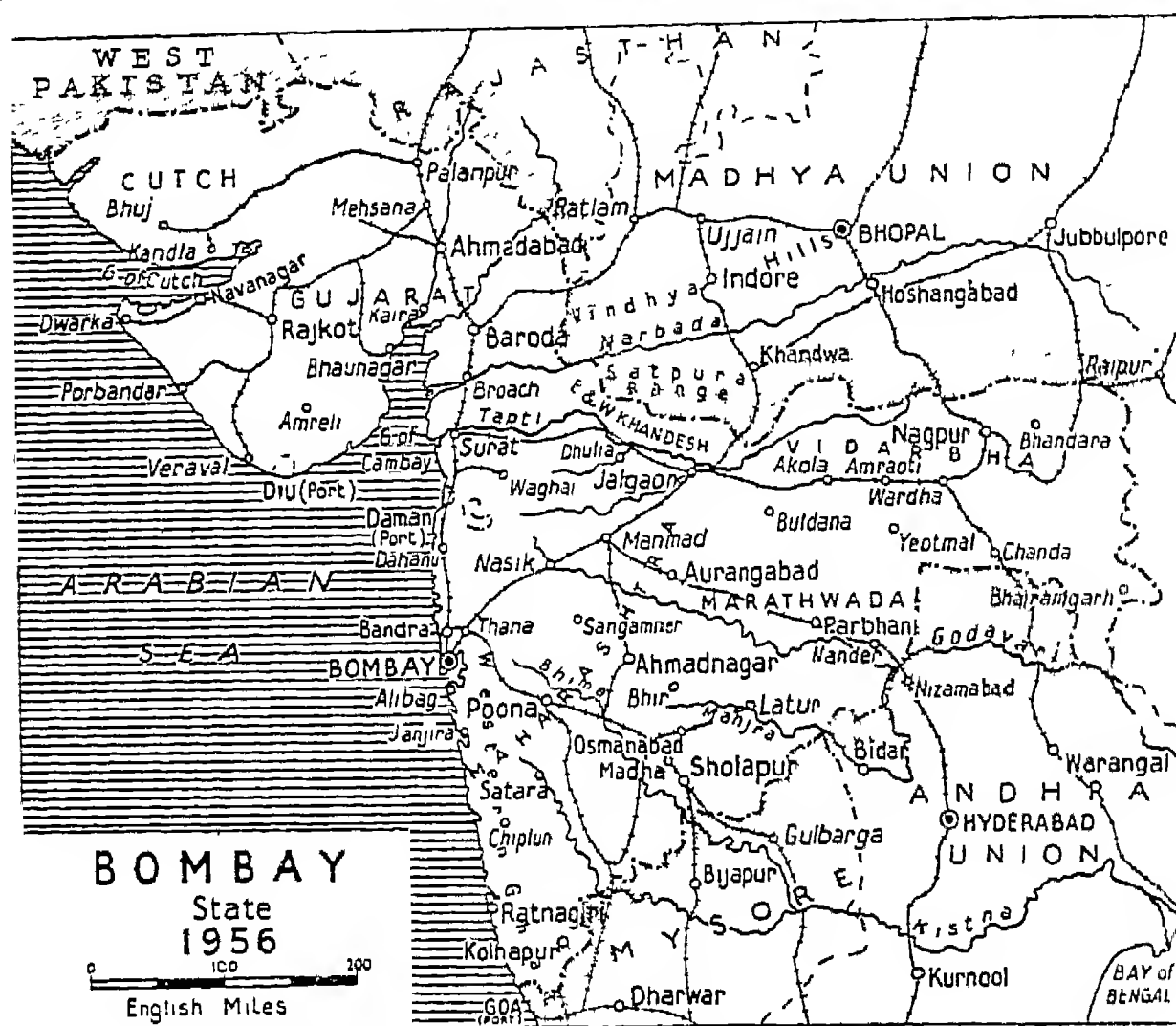
Bombay state as constituted in 1950 included the former British province of Bombay and 164 princely states and estates that had been enclaves within the British province and had acceded to India during 1948-49; the following were the most important:

	Area sq. miles
Balasior	189
Baroda	8,176
Bhor	910
Cambay	392
Chhota Udaipur ..	890
Idar	1,905
Janjira	379
Kolhapur	3,229
Miraj Senior	368
Miraj Junior	194
Palampur	1,794
Radhanpur	2,016
Rajpipla	1,517
Sangli	1,136

Under the states reorganization of 1956 Bombay lost to Mysore a large area in the south, but absorbed the whole of Saurashtra (the Kathiawar peninsula) to the north-west, and parts of Madhya Union and Hyderabad to the east, gaining about 77,000 sq. m. in area and 12,000,000 in population. The city of Bombay remained its capital and chief port; but it acquired in Kandla, on the Gulf of Cutch, a second useful port. Other important towns are Rajkot, Ahmadabad, Baroda, Surat, Nagpur, Aurangabad, Poona, Ahmadnagar, and Sholapur, all of historic as well as of industrial interest. The small Portuguese settlement of Damão forms an enclave in Bombay state.

Geographical Features

The whole of the Tapti valley lies within Bombay (formerly its head waters were in Madhya Union). The other chief rivers are the lower reaches of the Narmada, and



The state of Bombay, largest unit of the Republic of India, as reorganized in 1956

the upper reaches of the Godavari and its tributary the Manjra, and of the Kistna and its tributary the Bhima.

The north is a vast alluvial plain drained by the Narbada, Tapti, and other rivers flowing to the Arabian Sea. It is on the fringe of the monsoon area, with an unreliable rainfall of about 70 inches in the south decreasing to less than 30 inches in the north.

The coastal lowland from Daman to Goa is a much broken area, a very narrow level band near the coast rising into parallel ridges up to 2,000 ft. high, with farther inland the wall of the Western Ghats. Rainfall here, 75-100 inches a year, is more dependable; rice is the most important crop. Bombay city is the only large town in this area.

The scarp of the Western Ghats, running parallel with the coast almost the whole length of the state, forms a difficult barrier, pierced by a limited number of valley gaps through which go routes to the interior. Rainfall on this steep scarp (which sometimes rises almost sheer for 3,000 ft.) is as much as 200 inches annually in some parts, and the coastward slopes are generally heavily forested; the valuable timber teak is extracted from these forests.

East of the Ghats lies the Deccan plateau, sloping gently eastward and drained by the Kistna, the Godavari, and other rivers flowing eastward to the Bay of Bengal. The Deccan is subject to

drought, and rain, 20-25 inches annually, falls in a short season. Cotton, oilseeds, and millet are the main crops.

Agriculture is the occupation of two-thirds of the people of Bombay state. Artificial irrigation (more and more coupled with the development of hydro-electricity) is general, and output is high. Millet is a particularly important crop (nearly half the crop of this grain for all India is grown in Bombay); rice, wheat, sugar cane, ground nuts, and oilseeds of various kinds are other valuable food crops. Coconuts and mangoes are grown near the coast. The main cash crop is cotton (nearly half the total for all India); some 35,000 tons of tobacco are raised annually. Hardwoods, of which teak is the chief, are important forest products; betel and areca are grown.

Although predominantly agricultural, Bombay state includes some of the most developed industrial areas of India, notably in and around Bombay city. Cotton manufacture comes first, Bombay and Ahmadabad each having more than 60 mills; other centres making cotton textiles are Nagpur, Wardha, Akola, and Amravati. There are petroleum refineries at Bombay; salt is produced, particularly in the Kathiawar peninsula and in Cutch. Chemical and allied industries are being developed. The extraction of vegetable oils, and the making of soap, cement, antibiotics, and machine tools are other industries.

The development of hydro-electric power in the Western Ghats in Bombay was started by the enterprising Tata family to whose initiative Bombay city and the surrounding area owes much of its industrial development. Capacity has steadily increased.

The first railway in India, opened in 1853, ran from Bombay to Thana. The state has some 3,800 m. of rly. track; more than 28,000 m. of roads, including 14,000 m. of metalled highway; and several airports, of which Nagpur is highly important: it is a centre of the airways of India, and of growing value internationally, having excellent visibility for almost the whole year.

Bombay, the most literate state of India, possesses six universities: Bombay, one of the three oldest in India, like Calcutta and Madras founded in 1857; Bombay Women's University, founded 1949; Nagpur, 1923; Poona, 1948; Baroda, 1949; and Gujarat University, at Ahmadabad, 1950. There are more than 1,500 secondary schools, and 33,000 primary schools.

The main languages are Marathi (about 52 p.c. of the population) and Gujarati (34 p.c.). Hindi, the official language of India, is gaining ground as a *lingua franca*.

HISTORY. Bombay state has no uniform history, for its boundaries are not those of a former entity. In the 3rd century B.C. the area was part of the Maurya kingdom; but when that declined it was split up between a number of independent dynasties. The Chalukyas established their dynasty from the 7th century A.D., and after the 11th century the growing power of the Muslim invaders began to make itself felt. In the 16th and 17th centuries the Moguls had conquered most of the area; but the rise of the Mahrattas proved an irresistible challenge, and the Mahratta confederacy remained supreme until its collapse in 1818 after decisive defeats by the British in the neighbourhood of Poona.

The first Europeans to make contact with Bombay were the Portuguese, who occupied the town in 1530, and their influence on this part of India has been considerable, perhaps most of all because they brought Christianity. The first British factory in India was established at Surat in 1612. Bombay Island formed part of the marriage dowry brought by Catherine of Braganza to Charles II in 1662. Charles granted the

island to the (English) East India company for an annual rental of £10. It was placed under the presidency of the factory at Surat. In 1708 the headquarters of the governor were transferred from Surat to Bombay, and for about 100 years Bombay presidency was confined to Bombay Island, and Bankot, a factory on the mainland coast 75 m. to the south. The first Mahratta War, 1775, ended with the treaty of Salbai, 1782, which left the island of Salsette, immediately to the N. of Bombay Island, in British hands. Surat was re-occupied in 1800, but it was 1827 before the presidency took roughly the shape British India had in 1947. Sind, annexed in 1843, was placed under Bombay presidency, but in 1937 was detached from it when Bombay was made an autonomous province. It retained this status when transferred to the dominion of India in 1947. Including the former princely states that lay within British Bombay, the area became

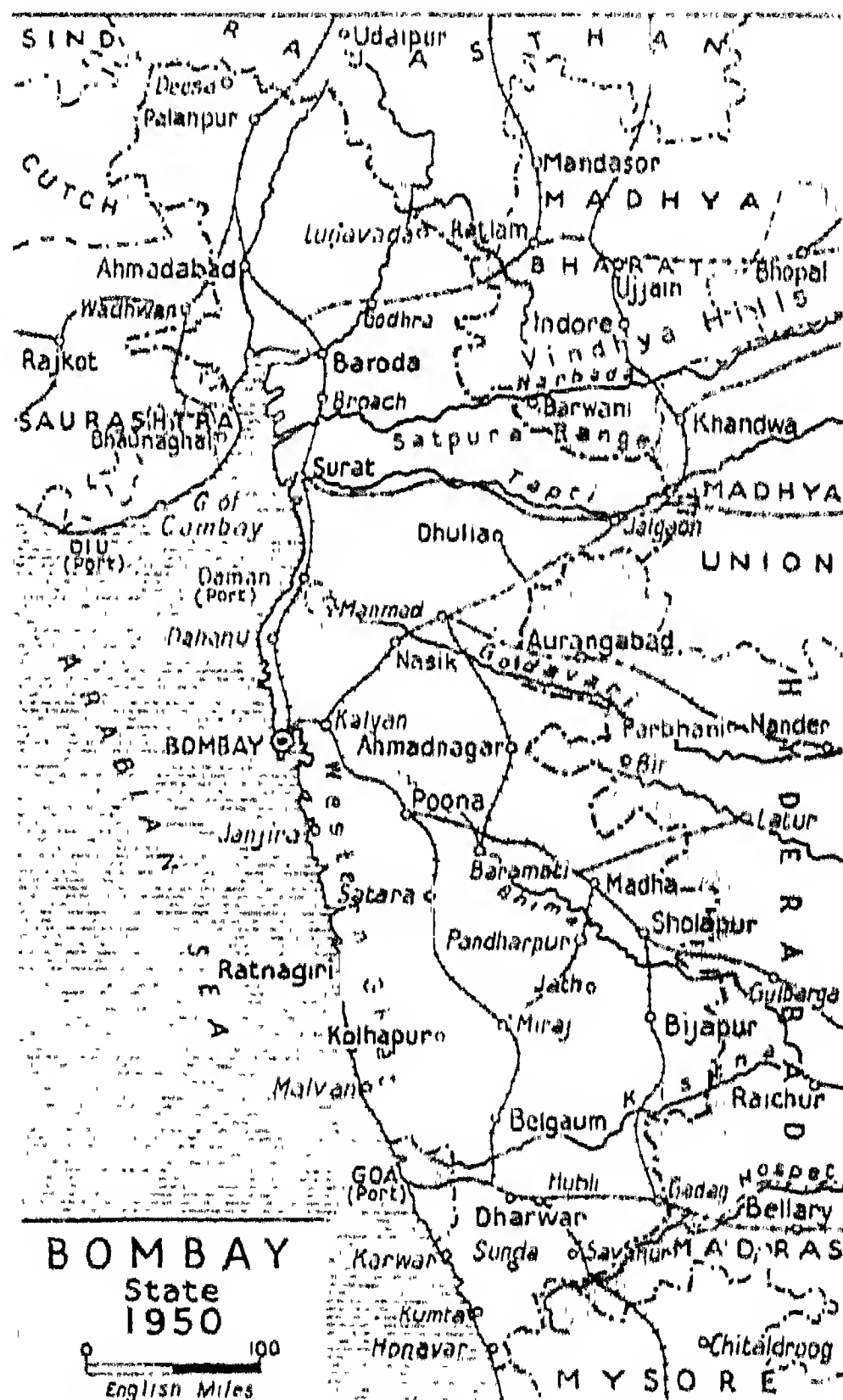
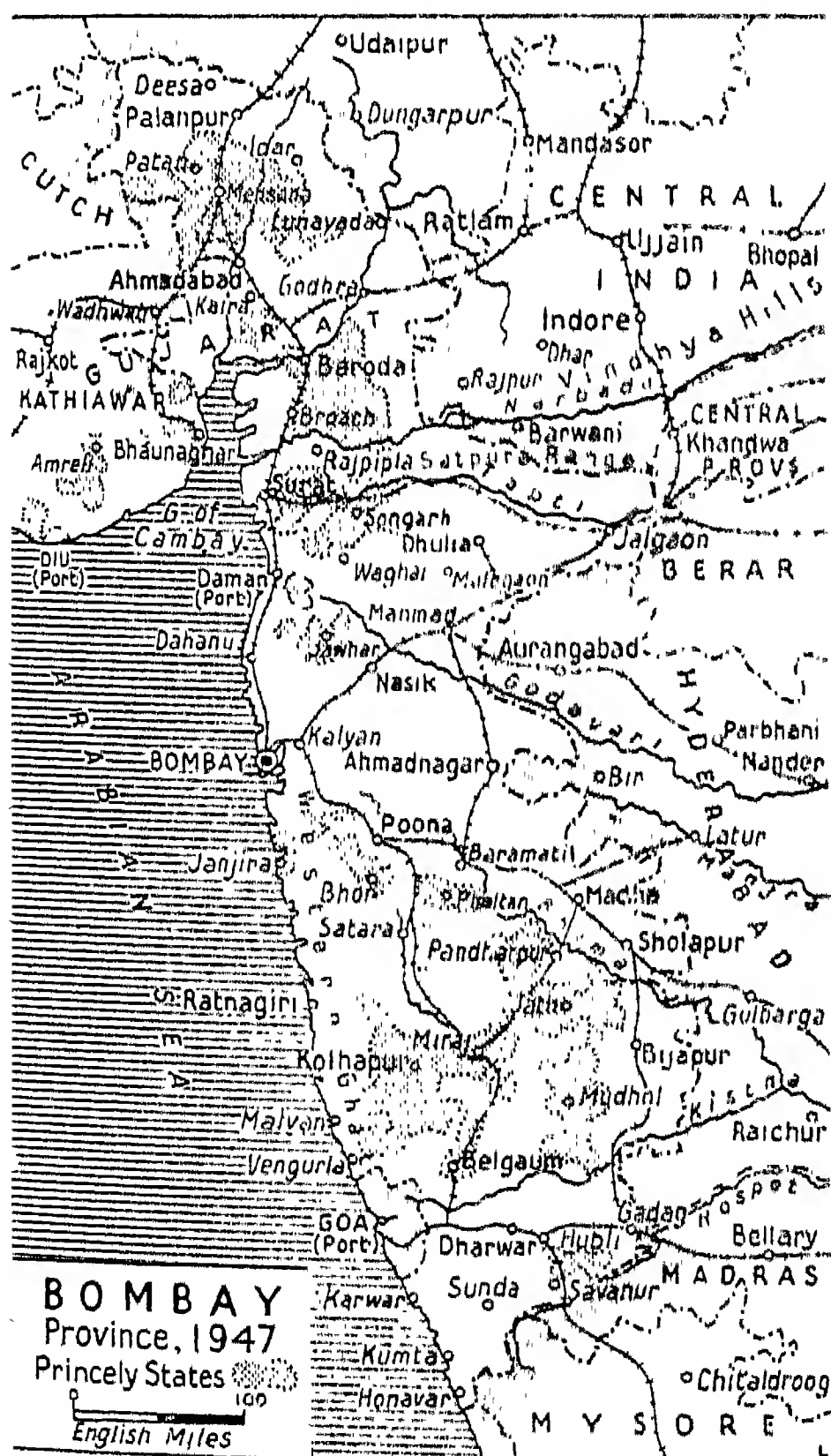
a governor's state of the Republic of India in 1950. In the recommendations for reorganization of the states of India published by the states reorganization commission in 1955, it was proposed that Bombay should lose territory in the south and take in Saurashtra. This met with a good deal of opposition from the Marathi-speaking part of the population who wanted their own state with Bombay city as capital. But the Gujarat-speaking people also claimed Bombay. The Congress Working Committee then proposed the setting up of three states: Maharashtra (Marathi-speaking), Gujarat (Gujarati-speaking), and Bombay City.

Rioting of considerable violence followed in Bombay city, and eventually the bilingual state shown in the map on page 1274 was set up in 1956, with the city of Bombay as capital.

Bombay. City of India, capital of Bombay state. The city was enlarged in 1950, as Greater

Bombay, to include suburbs on the mainland to the N., but its nucleus remains Bombay Island, 11 m. long, less than 25 sq. m. in area, which lies off the coast of Bombay state. The municipal corporation of Greater Bombay is composed of 124 representatives, with four statutory committees, an executive municipal commissioner, and a mayor elected for a term of one year. Area 91 sq. m. Pop. (1951) 2,839,270.

The largest city in India, and second only to Calcutta as a financial, commercial, and industrial centre, Bombay possesses the finest harbour in India, facing W. towards the valuable European markets; its hinterland covers much of W. and N. India; it is conveniently situated near two gaps through the Western Ghats. The great boosts given to its incipient cotton trade in the 19th century, particularly during the period of the American Civil War, helped to consolidate its importance; and the enterprise of its



The map on the left shows the British province of Bombay, as it existed 1937-47; within it lay a number of princely states (shown shaded) which enjoyed semi-independence under British suzerainty. The map on the right is of the state of Bombay in the Republic of India as first constituted in 1950

powerful Parsee families, especially the Tatas, has been a great factor in the growth of its commercial and industrial interests. It is connected with the mainland by the Sion Causeway to the N.E., which carries the Poona road, and rly. and road crossings to Bandra on the N.W.

Bombay Island is a double line of lava hills, connected by reclaimed tidal flats forming in the centre a densely populated plain. On the E. side are the docks, stretching southward over 5 m. from the oil depot of Sewri. Prince's Dock was opened in 1880; Victoria Dock, 1888; Alexander Dock, 1914. There is also a government dockyard, and a floating dock completed in 1947. The total wharf frontage is more than 6,000 ft. The deep and sheltered harbour to the E. covers some 75 sq. m.

What was formerly the European town includes the major financial and commercial interests. Here too are the chief public

clubs, and sports grounds, which terminates in Malabar Hill; Carnac Road, along which stand great houses, including the governor's house, and the Towers of Silence on Malabar Hill, Chowpatti beach, place of assembly at festival and holiday times, and the bazaars and heavily populated central trough reaching as far as Byculla. Closely packed tenements and industrial sites lie E. of the railway, e.g. at Parel.

Bombay, with more than 65,000 looms, has been called the Manchester of India; it produces more cotton cloth and yarn than any other town in the sub-continent, although Ahmadabad, in the north of Bombay state, has more mills. Parel is the centre of the industrial belt, but mills are to be found fairly generally. The first power plant was opened in 1915, and the increase in hydro-electric power available since then has had a striking effect on the industries and amenities of the city. Other important industries are engineering, sugar milling, and food processing, chemical making, dressing of hides and skins, and shipbuilding. India's film industry has its h.q. in Bombay.

The main exports are coal, cotton cloth, flour, oilseeds, hides and skins, manganese ore, spices, and sugar. Imports include building materials, grain, hardware, iron and steel, petroleum, motor vehicles, machinery, and foodstuffs. The customs revenue amounts to some £50,000,000, 40 p.c. of India's total.

Bombay is the h.q. of two railway systems (Central and Western), and has railway links with all the main towns of India; its airport, in the northern suburbs, is the centre of numerous air routes, both international and internal.

Bombay, UNIVERSITY OF. Educational body founded in 1857 as an affiliating body. Its scope was much enlarged in 1904, and again 1928. Under its authority are a school of economics and sociology, a department of chemical technology, and another of statistics. The university was reconstituted by an act of 1953 under which colleges previously affiliated became constituent colleges. It is governed by the senate, with a syndicate exercising executive authority. It includes a medical and a dental college, three colleges of law, and a college of science and economics. It awards degrees in agriculture, arts, commerce, education, engineering, law, medicine, oriental studies,

science, and social sciences. It caters for more than 33,000 students, and conducts post-graduate teaching and research in all branches of learning.

The Shrimati Nathibai Damodar Thackersey Women's University, also in Bombay city, was founded in 1949; in 1955 it had five colleges and 1,027 students.

Bombay Duck. The bummalow (*Harpodon nehereus*), a small fish of the Indian and China seas,



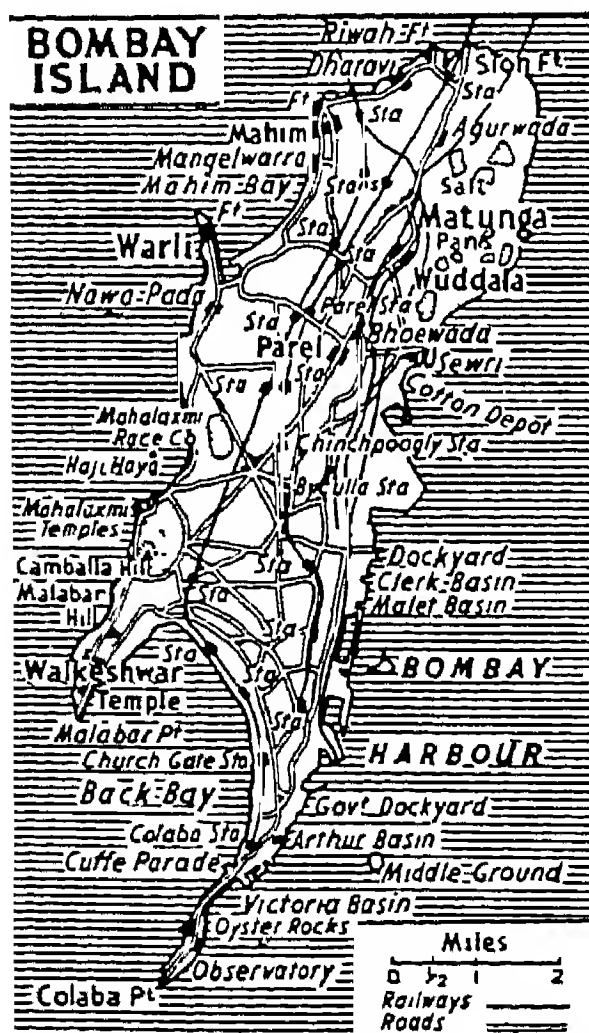
Bombay Duck. Small fish found in the Indian and China seas

which when salted and dried is used in the preparation of Indian curries. Bombay is a centre of trade for the dried fish.

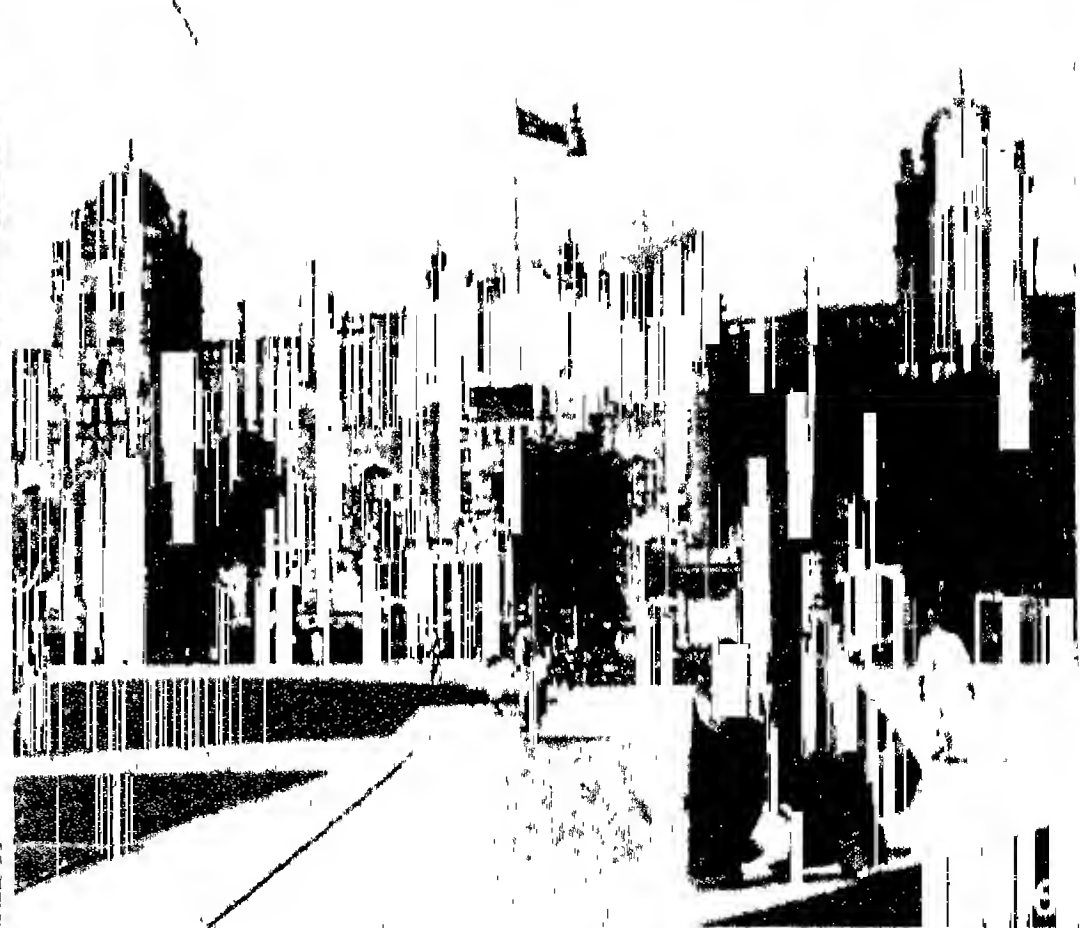
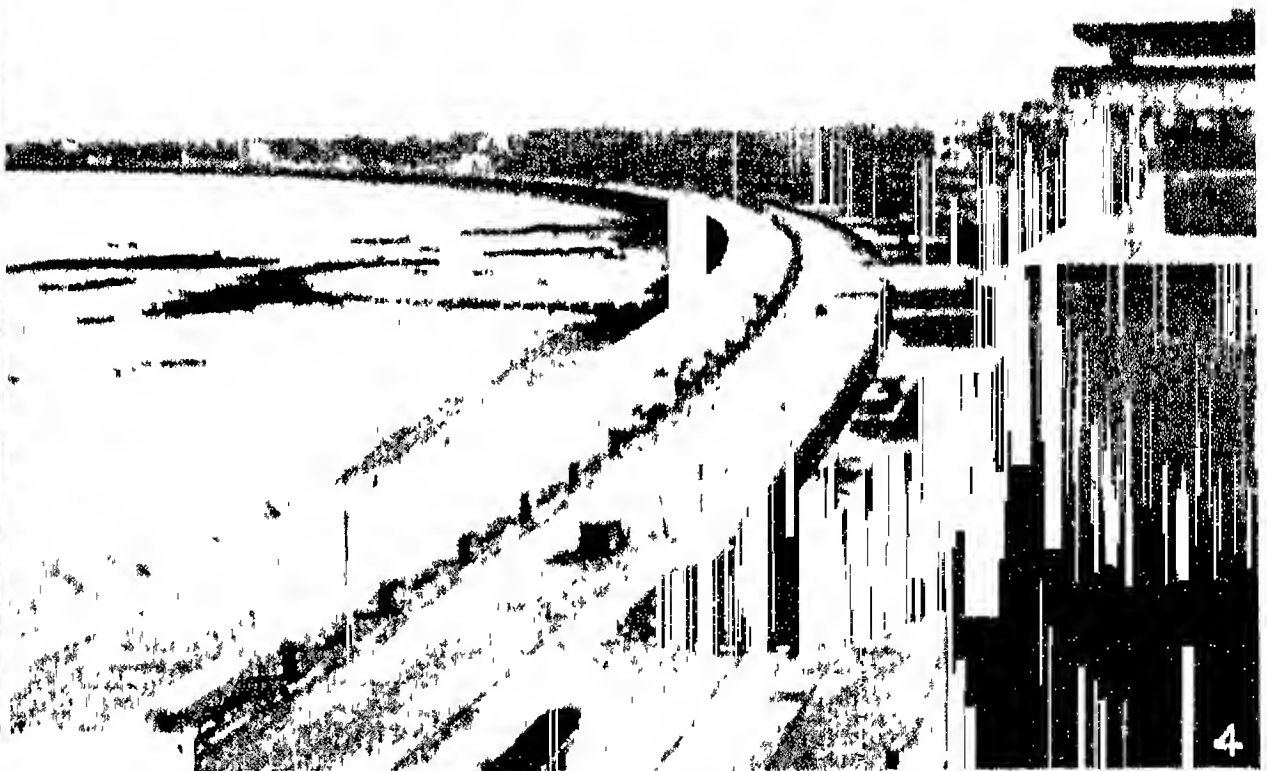
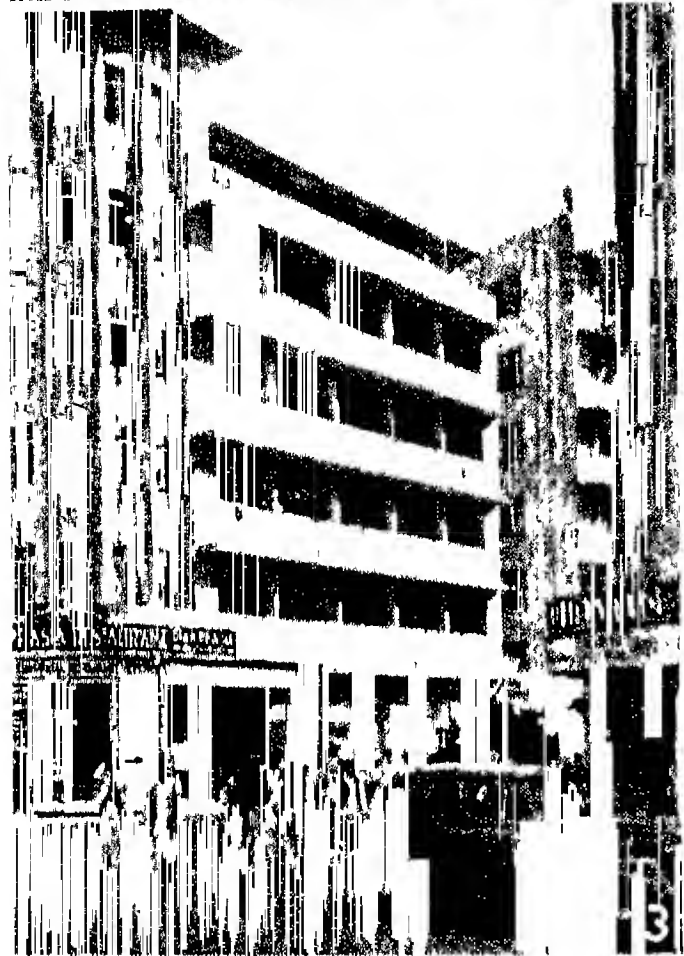
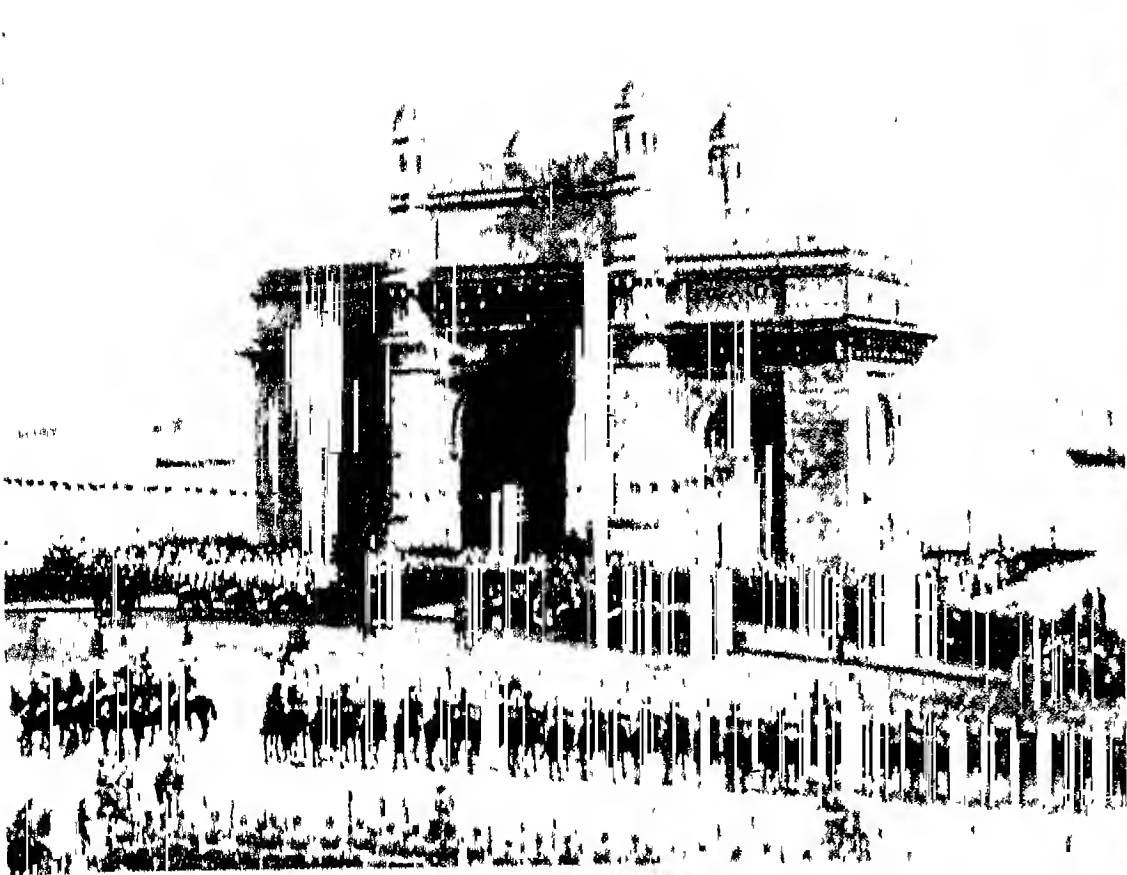
Bombazine (Lat. *bombycinum*, silken fabric). Name originally given to a silk or silk and wool fabric, later applied to a twilled dress material made of silk and wool, cotton and wool, or of silk or wool alone. The best bombazine has a silk warp and a worsted weft. Bombazine apparently originated in the Greek island of Cos, off the coast of Asia Minor, and seems to have been first made in England in the reign of Elizabeth I. In the early 19th century Norwich was famous for its bombazine.

Bomb Calorimeter. Instrument employed for the accurate determination of the quantity of heat evolved on combustion by explosives or combustibles. Instantaneous combustion yields the most accurate results in tests of this nature, since radiation errors are minimised, and this is effected in the case of combustibles by igniting them in an atmosphere of compressed oxygen.

The apparatus is a strong steel bottle, closed by a screw stopper, which carries a crucible for the sample and electric wires for its ignition, and a valve for the admission of oxygen and the release of the products of combustion. Explosives are ignited in an inert atmosphere, such as nitrogen. The charged bomb is immersed in water contained in a well-lagged vessel, the sample is ignited, and the rise in temperature of the water noted, when the heat evolved may be calculated. The water is constantly agitated, the thermometer is read through a telescope, and suitable correc-



buildings, many showing strong Portuguese influence; most of those designed by the British are in heavy Gothic. The more notable buildings are the ornate Victoria rly. terminus, the university designed by Sir Gilbert Scott, the town hall, the cathedral of S. Thomas, the high court, and, on the S.E. waterfront, the Gateway of India arch, built for the visit of King George V and Queen Mary in 1911. The main thoroughfares are Mahatma Gandhi Road, which forms with Hornby Road a fork enclosing the Maidan; Marine Drive, with large blocks of flats,



1. Archway built for the visit of King George V and Queen Mary in 1911 and called the Gateway of India. 2. View of Back Bay, in the S. of Bombay Island, from Malabar Hill. 3. Twentieth-century buildings on

Feroz Shah Mehta Road. 4. Blocks of flats in European style on Marine Drive. 5. Victoria station, Bombay's railway terminus. 6. General Post Office, a vast 19th-century block in a mixture of architectural styles.

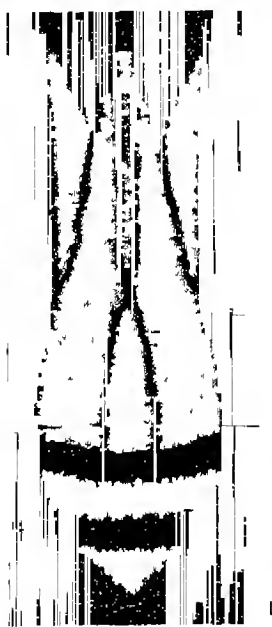
BOMBAY: ARCHITECTURAL CONTRASTS IN INDIA'S GREAT WEST COAST SEAPORT

tions are made for the heat absorbed by the metal, radiation losses, etc.

Bomb Disposal Section.

Branch of the Royal Engineers established in 1940 and trained to neutralise and remove unexploded

and delayed action bombs dropped by the enemy. A bomb disposal section usually consisted of one officer and 12 other ranks, though sometimes the section was in charge of an n.c.o. When a bomb penetrated the ground without exploding, the section's normal procedure was to dig away



Badge of Bomb Disposal Section

the surrounding earth and then remove the fuse. When it was not possible to remove the fuse, the bomb had to be lifted from the ground "live," then taken by lorry to an open space and exploded. One of the difficulties of removing bombs from soft soil, such as the London clay, was that all the time the bomb remained in the ground it tended to slip farther in at right angles to the point of impact. This often necessitated the digging of a tunnel to reach it.

On Sept. 11, 1940, a one-ton time-bomb fell in the roadway close to the W. door of St. Paul's cathedral. The bomb disposal section had to dig to a depth of 27½ ft. before reaching the bomb on Sept. 15. It was found impossible to remove the fuse, and the bomb was taken to Hackney Marshes, where it was exploded, and made a crater 100 ft. wide.

Bomb disposal sections served in most theatres of war, and worked in Malta throughout the air siege of that island. Bomb disposal squads were maintained for a number of years after the Second Great War to clear bombs which continued to be found in the U.K.

Bomber. Aircraft designed specifically for the offensive operation of dropping bombs. It was evolved in the First Great War, having been developed after reconnaissance and scout machines had been tried carrying small bombs as a supplementary part of their equipment in action. These bombs were dropped by hand, there being no bomb-racks or bomb-aiming sights. It was not until 1916 that real bombing

aircraft were introduced. The missiles were carried on external racks fitted to the wings and fuselage. Load-carrying capacity and range were the two main problems.

By 1917 both Great Britain and Germany possessed twin-engined machines which were defensively armed, and manned with a crew of four or five. They could carry nearly 1,000 lb. of bombs over considerable distances. All these bombers had maximum speeds of under 100 m.p.h.

The development of bombers was continued along two distinct lines—the day-bomber and the night-bomber. When the Second Great War started R.A.F. Bomber Command possessed twin-engined bombers only; the loaded weight of the heaviest of these was about 27,000 lb. Then various types of four-engined bombers were placed in production, all of them being of some 5,000 h.p. The bomb loads were in excess of 20,000 lb., and the range of these machines was as great as 3,000 m. An important technical development embodied in the heavy bombers of the belligerents was the gun turret for defence against enemy fighters. Accuracy of aim in delivering the bombs was immeasurably improved by the introduction of highly scientific and complex bomb-aiming devices and radar equipment. Like the R.A.F., the U.S.A.A.F. used heavy four-engined bombers, chiefly however in daylight operations. They were, in consequence, heavily armed, some being fitted with as many as 14 machine-guns.

Nevertheless, these bombers, being slower than contemporary fighters, were usually given fighter escort. In 1951, the Canberra, first British jet bomber, went into service with the R.A.F. It had a range of over 1,000 m., carried more than a ton of bombs, and, relying on its high speed, was unarmed. See Aviation. Military.

Bomber Command. Main long-range striking arm of the R.A.F. based in Great Britain. The command is divided into a number of groups, which are sub-divided into wings, each of the latter consisting of several squadrons. The squadrons are stationed at aerodromes controlled by their respective groups, and equipped with medium and heavy bombers according to operational duties. Nowadays heavy bombers constitute the majority of the command's aircraft.

Bomber Command had its genesis at Eastchurch (*q.v.*) in 1913, when the Royal Naval Air Service (*q.v.*) conducted a number of experiments in the dropping of hand grenades, which were thrown over the side of the aircraft with a rough and ready aim. Eventually the grenades were increased in size until they became bombs and no longer manageable by hand. Mechanical racks for their release were then fixed beneath the aircraft, which, thus equipped, were ready for service in war. Through most of the First Great War bombing was done from a low level and aiming remained a matter of guesswork. The bombs themselves were light, and, as late as 1916, 20-lb. bombs were being dropped on such massive targets as battleships. As the carrying capacity of bombers increased, heavier bombs would be dropped, and the introduction of a reliable bomb sight (*q.v.*) in 1917 enabled the technique of precision bombing to be developed. The first bomber intended for long-range work went into service about the middle of 1918, and by the end of the First Great War the R.A.F. was operating aircraft capable of carrying a 2,000-lb. bomb, though the latter was not actually used.

For some years there was no specific organization in the R.A.F. with bombing as its sole responsibility, and there was a tendency to make the reconnaissance and fighter aircraft serve also as bombers. Eventually it was realized that bombing demanded its own organization, training, and air crews if it was to fulfil its possibilities as long-range artillery. So Bomber Command was established on July 14, 1936, to develop and exploit strategic bombing.

The principal function of Bomber Command is to attack and destroy the enemy war organization and potential; to act as long-range artillery hitting supply and communication centres far behind the enemy front line. Bomber Command struck the first British blow in the Second Great War with its raid on the Kiel Canal on Sept. 4, 1939. But for two years a shortage of aircraft restricted its operations to a strategic defensive, its strength being mainly employed in bombing the more urgent targets dictated by the day-to-day military situation. Examples of this were the raids on German aerodromes in Holland and Belgium and on

the German invasion ports. Mine-laying in enemy waters was another early task.

As the war progressed and more aircraft came into service, Bomber Command sent increasingly heavier forces deeper into enemy territory and carried an ever-mounting offensive against armament plants, oil refineries, aircraft works, ports, railways, and industrial centres in Germany, Italy, France, and the Netherlands. Eventually it became a frequent practice for Bomber Command to send as many as 1,200 aircraft in one raid on a single target. Attacks by Bomber Command were a prime factor in the eventual collapse of Germany. The disruption of German communications made possible the rapid advance of the Allied armies in 1944-45.

In 1939 Bomber Command's strength mainly consisted of twin-engined medium bombers such as the Blenheim, Wellington, Whitley, and Hampden. Towards the close of 1941 Bomber Command received delivery of its first four-engined bomber, the Stirling. This was followed by the Halifax and Lancaster. In these aircraft heavier bomb loads could be carried greater distances.

In 1939 Bomber Command dropped 31 bombs on enemy territory, but by the end of the Second Great War a total of 1,185,981 bombs, ranging from 250 to 22,000 lbs., had been released in all theatres of operations, in addition to 35,599 mines laid in enemy waters. The command's battle casualties were 39,291 killed, 10,961 missing, 9,843 prisoners of war, and 4,167 wounded. Non-battle casualties were 14,367. Aircraft lost totalled 9,163. (See *Air Raids 2: On Germany*.)

In 1950 a number of R.A.F. squadrons were equipped with U.S. B29 superfortress bombers as part of the aid given through N.A.T.O.

David Le Roi

Bomb Sight. Instrument enabling aircraft to drop their bombs on, or as near as possible to, a specific target. The factors governing the hitting of a particular target are: aircraft speed, the effect of gravitation, wind resistance, height, drift, and, with a moving target, target motion. In the early type of bomb sight these factors were approximated by the bomb-aimer who directed the pilot to manoeuvre the aircraft into the bombing position.

Shortly before the outbreak of the Second Great War a bomb sight

was developed which was linked to the automatic pilot (*q.v.*). This enabled the bomb-aimer himself to take control of the aircraft while laying his aim. The two best-known automatic bomb sights are the Sperry and the Norden. In such bomb sights the gravity, wind resistance, aircraft speed, height, and drift are determined from scales on the apparatus itself. The target is then tracked or "covered" by moving a cross-wire up or down a vertical line in the eye-piece; this vertical line is the bomb-aimer's line of sight to the target. When all the settings have been made, the bomb-aimer, because his sights are synchronised with the automatic pilot, directs the aircraft on the run-up to the target. Immediately the cross-wire intersects the pin point on the line of sight wire an electric circuit is closed which actuates the bomb-release. Towards the end of the war bombers were guided to their targets, and the moment of bomb release was controlled, by radar from the bomber's base.

Bomlo. Island off the S.W. coast of Norway, lying N. of the entrance to Hardanger Fiord (also called Bomlo Fiord). The island is long, narrow, and hilly. The chief town is Bremnes which in 1954 had a population of 4,593.

Bon, Cape. See Cap Bon.

Bona. This Algerian seaport is considered under the more usual French form *Bône* (*q.v.*).

Bona Dea (Lat., good goddess). Ancient Roman divinity. A goddess of fertility, her cult was probably borrowed from that of the Greek Demeter (*Ceres*), the corn goddess. Two festivals were held in her honour, one on May 1 on the Aventine hill, to commemorate the founding of her sanctuary; the other, regarded as a national ceremony, on Dec. 3-4, in the house of a chief magistrate. The rites were performed by vestal virgins, and no man was allowed to be present. Great scandal was caused (62 B.C.) by Publius Clodius, who managed to secure admittance by disguising himself as a woman. See *Clodius Pulcher*.

Bona Fide. Latin phrase meaning in good faith. Its opposite is *mala fide*, in bad faith. It is chiefly a legal term, although used also in ordinary language, and implies that a contract or undertaking of any kind has been entered into without any fraud, concealment, or misrepresentation. If this is not so there is a case for repudiating the engagement.

In certain Acts of Parliament it is expressly stated that a thing is deemed to have been done in good faith when it was done honestly, whether negligently or not.

Bonai. Most southerly of the former tributary states of Chota Nagpur, India. It was merged in 1948 in Orissa. Surrounded by the Bonai Hills, it is cultivated in only one-twelfth of its area of 1,297 sq. m.

Bonanza. Spanish and Portuguese word meaning fair weather at sea or prosperity generally. It found its way into English through the miners on the Pacific coast of America, more or less acquainted with Spanish, who applied it to a very rich body of ore in a mine: e.g. the Comstock lode in Nevada, U.S.A. A number of American towns are called simply Bonanza.

Bonaparte OR BUONAPARTE. Name of the Corsican family to which Napoleon I belonged; he adopted the spelling Bonaparte after he joined the French army. Of Italian origin the family has been traced back to Florence at about 1100. Francesco Buonaparte settled in Corsica early in the 16th century.

Carlo Buonaparte, a descendant of Francesco and the father of Napoleon, was an official in the service of France at Ajaccio, and by his wife, Letizia Ramolino, had a large family. Carlo died in 1785, but Letizia lived until 1836, surviving her famous son by more than fifteen years. Of their family Napoleon was the second of those who grew to manhood. The eldest was Joseph, king of Spain; after Napoleon came Lucien, then Marianne Elise. Louis, king of Holland, the father of Napoleon III, was the fifth child. Two daughters, Pauline and Caroline Marie, the wife of Joachim Murat, followed, and then came the youngest child, Jerome, king of Westphalia.

The Bonapartes have for long been represented in the male line only by the descendants of Lucien and Jerome. The American Bonapartes are descended from Jerome's marriage with Elizabeth Patterson.

Bonaparte, CHARLES LUCIEN (1803-57). French prince and naturalist. Son of Lucien Bonaparte, he was born in Paris, May 24, 1803. He devoted most of his time to the study of birds, and on this he wrote a number of volumes. His *American Ornithology*, 1824-33, which was a continuation of Alexander Wilson's work, was published at Philadelphia,



Bonaparte family. 1. Charles Lucien, 1803-57. 2. Carlo, 1746-85. 3. Jerome, 1784-1860. 4. Joseph, 1768-1844. 5. Louis, 1778-1846. 6. Lucien, 1775-1840. 7. Victor, 1862-1926. 8. Pauline, 1780-1825. 9. Napoleon, 1822-91

where he resided for several years. In 1840 he succeeded his father as prince of Canino; he was then living mainly in Italy. In 1847-48 he intervened in political life; forsaking his former friend, the pope, he declared publicly for the inde-

pendence of Italy, and was chosen a deputy to the national assembly, in which he took an active part. However, the movement failed, and he was forced to leave the country. Lucien married a cousin, daughter of Joseph Bonaparte,

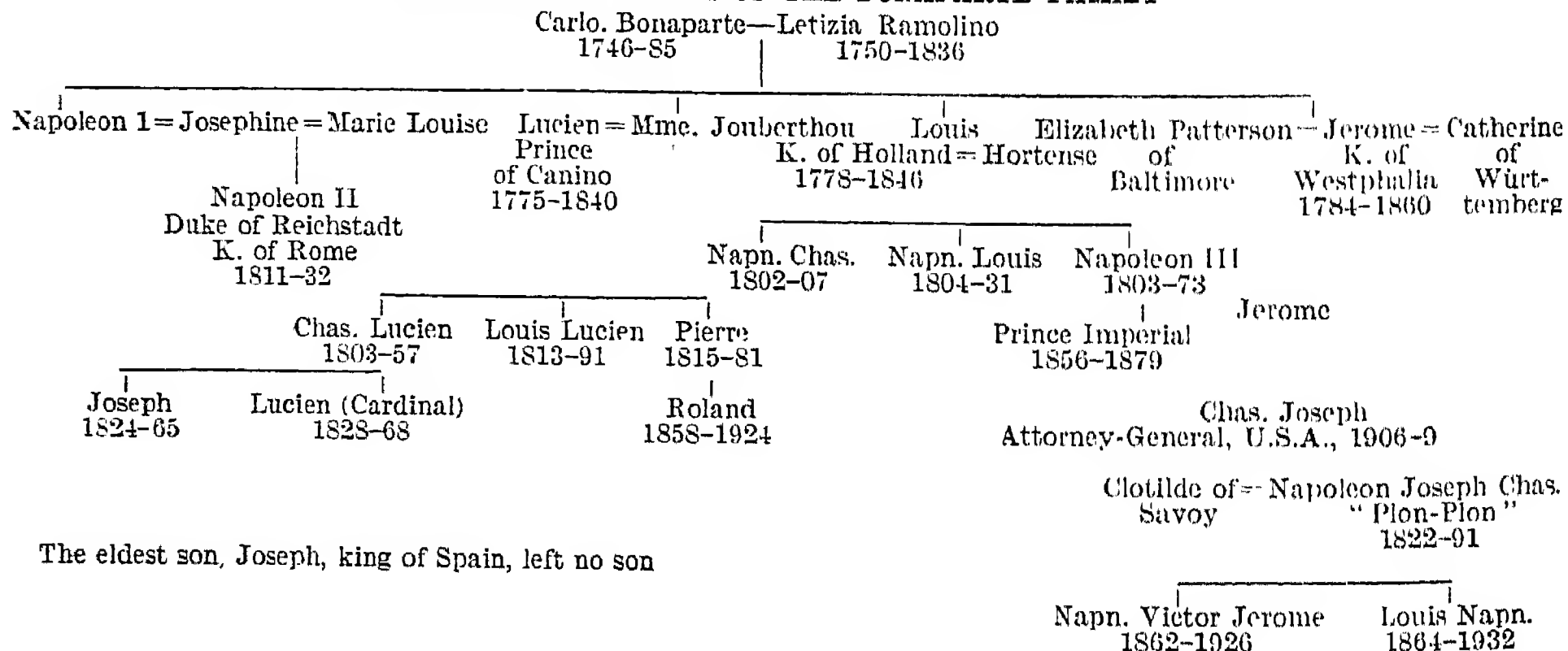
and had two sons. The elder, Joseph Lucien, died without sons in 1865, and the younger, Lucien Louis, became a cardinal. He himself died in Paris, July 29, 1857.

Bonaparte, HORTENSE EUGENIE (1783-1837). Queen of Holland, mother of Napoleon III. Born in Paris, the daughter of Alexandre, Vicomte de Beauharnais, she was adopted by Napoleon I on his marriage with her mother, Josephine. In 1802 she married Louis Bonaparte, afterwards king of Holland, 1806-10, at Napoleon's request. It was a dynastic marriage, and a final separation took place when Louis retired from Holland in 1810. After 1814 Hortense lived in retirement at Arenberg, Switzerland, where she died. Besides writing an account of her travels during the year 1831, she composed the tune for *Partant pour la Syrie*, which her son, Napoleon III, made the national anthem of France under the Second Empire.

Bonaparte, JEROME (1784-1860). King of Westphalia and youngest brother of Napoleon I. Born at Ajaccio, Nov. 15, 1784, he crossed over to France when a boy and served in the army and then in the navy. Until 1806 he sailed with the fleet, mainly in the West Indies; he then held a command in Germany, and in 1807 was chosen ruler of the new kingdom of Westphalia. He retained an unstable throne for six years, and took part in the campaign in Russia. He fought at Waterloo, after which he lived in Germany, Italy, and Switzerland. In 1848 he was in France, and under his nephew, Napoleon III, became a marshal and president of the Senate.

Jerome died June 24, 1860, and his son Napoleon, called Plon-Plon, became the heir of the Bonapartes. This son and two other

GENEALOGICAL TABLE OF THE BONAPARTE FAMILY



children were the result of Jerome's marriage with Princess Catherine of Württemberg. Previous to that union, when at Baltimore, he had married Miss Elizabeth Patterson, and from this union the American Bonapartes are descended. Napoleon refused to recognize the legality of the marriage, Jerome then being a minor, and after a visit to Europe the lady returned to Baltimore, where she lived until 1879.

Bonaparte, JOSEPH (1768-1844). King of Spain. Eldest brother of the great Napoleon, Joseph left Corsica about 1790, and was in France during the greater part of the Revolutionary period. He was a member of one or two of the governing bodies, and as a diplomatist treated on behalf of France with the U.S.A., Austria before the peace of Lunéville, and Britain before that of Amiens. After Napoleon attained supreme power, Joseph was made king of Naples, where he reigned for two years, on the whole successfully and wisely, and in 1808 king of Spain. He remained in that country during most of the Peninsular War, but was never more than an automaton directed by Napoleon, and frequently threatened to abdicate. In 1813 his nominal authority came to an abrupt end, owing to Wellington's victory at Vittoria, followed by his brother's displeasure. The breach between them was not final, and in the last stirring days Joseph was again at Napoleon's side. After 1815 he settled in the U.S.A., but he was living in Florence when he died, July 28, 1844.

Bonaparte, LOUIS (1778-1846). King of Holland and brother of Napoleon I. Born at Ajaccio, Sept. 2, 1778, Louis followed his elder brother to France, where he received a military training. He was with Napoleon in Italy and Egypt, and had been a member of the French council of state and governor of Paris when he was placed upon the throne of Holland in 1806. He ruled, more or less successfully, for four years, but lost the favour of the emperor, and when it came to fighting between the French and the Dutch he fled. The end of his life was chiefly passed in Italy, where he was able to indulge his literary tastes. He died July 25, 1846. Louis married Hortense Beauharnais, a union which proved unhappy. They had three sons. Two died before their father; the youngest became the emperor Napoleon III.

Bonaparte, LUCIEN (1775-1840). Prince of Canino, and younger brother of the great Napoleon. When little more than a boy Lucien

was an active figure in the troubles which disturbed Corsica, and after he settled in France he worked zealously for the Jacobin cause. As president of the Council of Five Hundred in 1799, he was of service to his brother at a critical moment, and was afterwards a minister under the Consulate and ambassador at Madrid. He had several quarrels with Napoleon, and in 1803, on marrying the widow of a stockbroker, he retired to Italy, where he received the papal title of prince of Canino. Nevertheless he returned to France to support the fallen emperor in 1815. At one time Lucien was a prisoner in England, having been taken by a British ship while on the way to America. He died in Rome, June 29, 1840.

Lucien had five sons. The eldest was Charles Lucien, the naturalist (v.s.). The second was Paul (1806-26). The third, Louis Lucien (1813-91), was born and educated in England, and was a deputy under the Second Republic. He was interested in philology, and was an authority on most European languages, especially Basque. Lucien's fourth son, Pierre Napoleon (1815-81), was a deputy under the Second Republic and senator under his cousin, Napoleon III. In 1870, during an altercation, he shot a journalist, but the courts acquitted him. The fifth son, Antoine (1816-77), was a member of the national assembly in 1849.

Bonaparte, MARIE PAULINE (1780-1825). Sister of Napoleon I. Born at Ajaccio, Oct. 20, 1780, she crossed over to France in 1793, and while living at Marseilles had many suitors. She married a soldier named Leclerc, with whom she went to the West Indies, where he had a command, but returned after his death in 1802. In 1803 Pauline married Prince Camillo Borghese, but they did not stay together for long, and she lived mainly in Paris and Rome. Napoleon always showed a partiality for his youngest sister. He made her duchess of Guastalla in 1806; but in 1810 she was banished from court for offending the empress. After 1815 the duchess of Guastalla lived chiefly in Italy, dying of cancer at Florence, June 9, 1825.

Bonaparte, NAPOLEON JOSEPH CHARLES PAUL (1822-91). Son of Jerome Bonaparte by his marriage to Catherine of Württemberg, and nephew of Napoleon I. Called Prince Napoleon and nicknamed Plon-Plon, he became the head of the Bonapartes after the death of the Prince Imperial in 1879. Born Sept. 9, 1822, he showed considerable ability, and when old enough

to enter public life posed as a democrat. He represented Corsica in the National Assembly of 1848, and was prominent during the reign of his cousin, Napoleon III. In 1854 he commanded a division in the Crimea, and there received his nickname, from *plomb*, lead.

Bonaparte was minister of the colonies for a short time, but left that post to assist his father-in-law, Victor Emmanuel, in Italy. In France he was prominent, if somewhat noisy and indiscreet, until the war of 1870, which he disliked, sent him into obscurity. In 1879 he emerged as the Bonaparte claimant for the French throne, but his candidature was never serious. He died March 17, 1891. Plon-Plon was like his great uncle in appearance and had many of his characteristics. His son, Napoleon Victor (q.v.), succeeded him as head of the Bonapartes.

Bonaparte, NAPOLEON VICTOR (1862-1926). Head of the Bonaparte family. The son of Napoleon Bonaparte (Plon-Plon), he was born in Paris, July 18, 1862. He lived in France until 1886, when he was expelled. In 1910 he married Clémentine, a daughter of Leopold II of the Belgians; they had a son Napoleon Louis (b. 1914). Napoleon Victor died May 3, 1926.

Bonar, HORATIUS (1808-89). Scottish Presbyterian minister and hymn writer. Born at Edinburgh,



Dec. 19, 1808, and educated at the university, he was minister at Leith and Kelso, and at the disruption in 1843 was one of the founders of the Free Church. After further labours at Kelso, he became minister of the Chalmers Memorial church at Edinburgh in 1866, and in 1883 was moderator of the General Assembly. He edited *The Christian Treasury* and other religious periodicals, and compiled *Hymns of Faith and Hope*, 1857-66. He died July 31, 1889.

Bonasa. Genus of N. American grouse. It includes several species, of which the best known is the ruffed grouse (*B. umbellus*). It may be recognized by the frill of dark feathers round the neck.

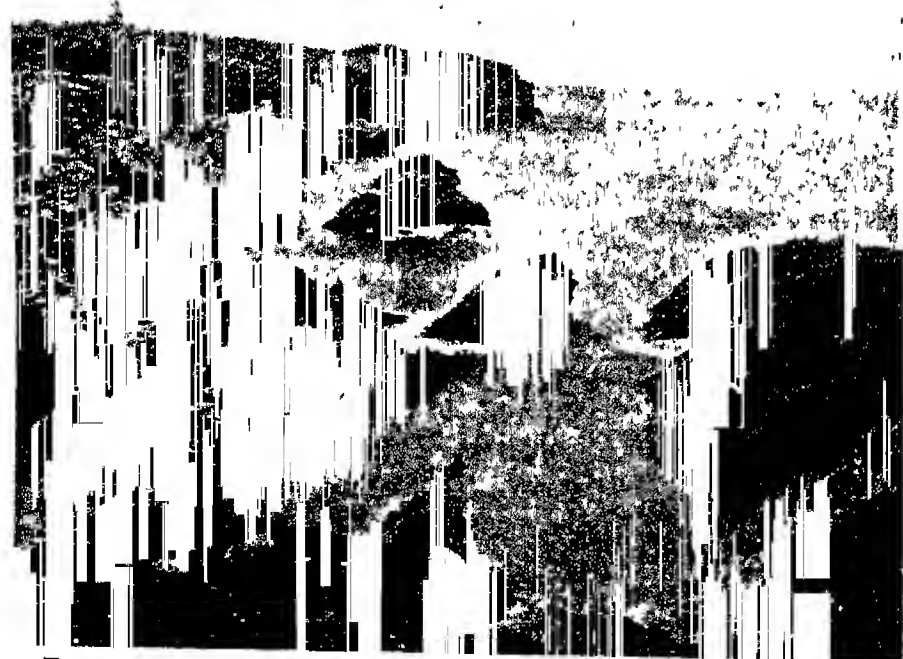
Bonaventure, GIOVANNI FRIDANZA (1221-74). Italian saint and theologian. He was born at Bagnorea, Tuscany, and about 1240 entered the Franciscan order, of which he was general from 1257-74. He studied and lectured at

the University of Paris, where he and Thomas Aquinas received their doctorates in theology on the same day in 1255. In 1265 he refused the archbishopric of York. In 1271, on his advice, Gregory X was elected pope, and in 1273 Bonaventure was made cardinal bishop of Albano. He died at the council of Lyons, July 15, 1274, was canonised by Pope Sixtus IV in 1482, and declared a doctor of the Church in 1587. His festival is on July 14.

Bonaventure was known as the Seraphic Doctor. A pupil of Alexander of Hales, he maintained that matter pertained to spiritual no less than to corporeal things, and, synthetical rather than analytical, preferred S. Augustine to Aristotle. He wrote on dogma and on mysticism, and nearly 500 of his sermons are extant. A complete and critical edition of his works in 10 volumes was published by the Franciscans at Florence, 1882-1902.

Bonavis. Village and ridge of France, in the dept. of Nord. It is S. of Masnières, on the road from Cambrai. In the battles for Cambrai, 1917-18, the British took the ridge, Nov. 20, 1917. It was regained by the Germans, Nov. 30. The spur from Bonavisto Masnières was taken by New Zealand troops, Sept., 1918. See Cambrai, Battles of.

Bona Vista. Cape, bay, town, and district in the E. of Newfoundland. The cape forms the S.E. limit



Bona Vista, Newfoundland, said to be the first land sighted by John Cabot in 1497

of the bay, which the numerous islands and rocks render difficult of navigation. The town, 75 m. N. of St. John's, with which it is connected by rly., is one of the oldest settlements in the island. Pop. (1951) 3,718.

Bonchamp, CHARLES MELCHIOR ARTUS, MARQUIS DE (1760-93). French soldier, leader of the revolt

in La Vendée. Born at Jouverteil, Anjou, May 10, 1760, he served in the American army in the War of Independence. On his return to France he became a captain in the French army. A pronounced royalist, he retired to Anjou at the outbreak of the Revolution, and in 1793 was chosen to lead the Vendean insurgents of his province. He fought at Bressuire, Thouars, and Fontenay, and was wounded at Cholet, Oct. 16, 1793, dying next day. It is said that when dying he ordered no vengeance should be taken on 5,000 prisoners.

Bond. In chemistry, the agency which joins atoms together to form molecules. During the later 19th century there was much dispute about the nature of such linkages; but after the adoption of Rutherford's theories on atomic structure, it came to be believed that chemical bonds are formed by electrons, two electrons being usually necessary for the formation of any one bond. In any atom the electrons available for bond formation (called the valency electrons) are those which occupy an outer unclosed or uncompleted shell. Elements in which the outer shell is closed (helium with two electrons completing the first shell; neon, argon, krypton, xenon, and radon each with eight electrons completing an outer shell) have no valency electrons to form chemical bonds.

Bond. In business, a written undertaking to pay a sum of money or to perform a certain contract. Bonds are usually sealed, and if they are the statute of limitations does not apply to them until 12 years have elapsed. Certain governments and corporations give bonds in return for the money they borrow. The owners of bonded warehouses and some other persons holding responsible positions are required

to enter into a bond, forfeiting a certain sum if negligence is proved against them. See also Bonding.

Bond. In English law, an acknowledgement of a debt, in writing and under the seal of the debtor. A bond requires no consideration, and is therefore a good way of making binding a promise for which there is no legal consideration.

Bond, SIR EDWARD AUGUSTUS (1815-98). Principal librarian of the British Museum 1878-88. Born on Dec. 31, 1815, the son of a clergyman schoolmaster, he was educated at Merchant Taylors, school. After working at the Record office, he transferred in 1838 to the British Museum, where he became an expert palaeographer. Upon being made keeper of the manuscript dept. in 1866 he began a policy of rigorous reform, which continued when he was unexpectedly appointed principal librarian in 1878. His reforms included the printing of the MS. catalogue of the printed book dept., and the introduction of the sliding press, which enabled more books to be accommodated in less space. In 1873 he founded the Palaeographical Society. He retired in 1888. Created K.C.B. in the New Year honours of 1898, he died on Jan. 2 of that year.

Bond, SIR ROBERT (1857-1927). Newfoundland politician. Born at St. John's, Newfoundland, Feb. 25,



Sir Robert Bond,
Newfoundland
politician
Elliott & Fry

1857, the son of a merchant who had emigrated from Torquay, he entered public life in 1882 as a member of the legislative assembly, becoming speaker in 1884. Made colonial secretary in 1889

and premier in 1900, he carried through the negotiation of reciprocity treaties with the U.S.A. in 1890 and 1902. He successfully opposed a union with Canada. He was leader of the Liberal opposition in the assembly from 1909 until he retired in 1914. Knighted 1901, made privy councillor 1902, he died March 16, 1927.

Bonde. Scandinavian word for peasant. Originally the bönder were the most powerful class, the free and noble-born small proprietors, but at times they became mere peasants, and even serfs.

Bonded Warehouse. Structurally secure premises, approved by the appropriate revenue authorities, for the storage and manipulation of dutiable goods upon which the duties of customs or excise have not been paid. The warehouse keeper is required to give bond, with approved sureties, as security for the duty on the goods—hence the term bonded warehouse. Revenue officials are normally in constant attendance, and warehouses are secured

under revenue and warehouse keeper's locks when closed. The bonding system has many advantages for a merchant. He can postpone payment of duty until he has a customer for his goods, or export them under revenue control without payment of any duty, and he can perform certain operations on bonded goods, e.g. blending and bottling of wines and spirits. The system in the U.K. dates from 1700.

Bondfield, MARGARET GRACE (1873-1953). British politician. She was born at Chard, Somerset, March 17, 1873.



Margaret Bondfield,
British politician

and became interested in political reform during her girlhood. She was assistant secretary of the shop assistants' union, 1898. 1908, and advised the Labour convention at Washington, 1919, and at Geneva, 1921. Lecturer and writer for the socialist and labour movement, she became secretary of the national union of general workers (women workers' section). In 1923 she was first woman chairman of the general council of the T.U.C. and was returned as Labour M.P. for Northampton. M.P. for Wallsend 1926-31, she was minister of Labour, 1929-31, the first woman member of a British cabinet. C.H. 1948, she pub. an autobiography 1949. She died June 16, 1953.

Bonding. In brickwork and masonry, (1) the overlapping of bricks or of stone blocks so that they shall break joint- i.e. show no continuous weak vertical joints; (2) the further interlacing of the structure by inserting in the brickwork or masonry narrow strips of galvanised or other rust-proof metal to tie the work together; (3) the insertion of metal or earthenware ties at intervals across the cavity of a hollow wall; (4) the placing of lengths of timber horizontally within the brickwork of a wall, the object in using these "bond-timbers," however, being not so much directly to bind the brickwork as to provide means of attachment for other woodwork such as laths and battens.

The purpose of bonding is to tie the wall together as a whole, and to distribute its weight (and that of any superimposed load) equally over the foundations. This is illustrated by Fig. 1, representing part of a brick wall; the broken dia-

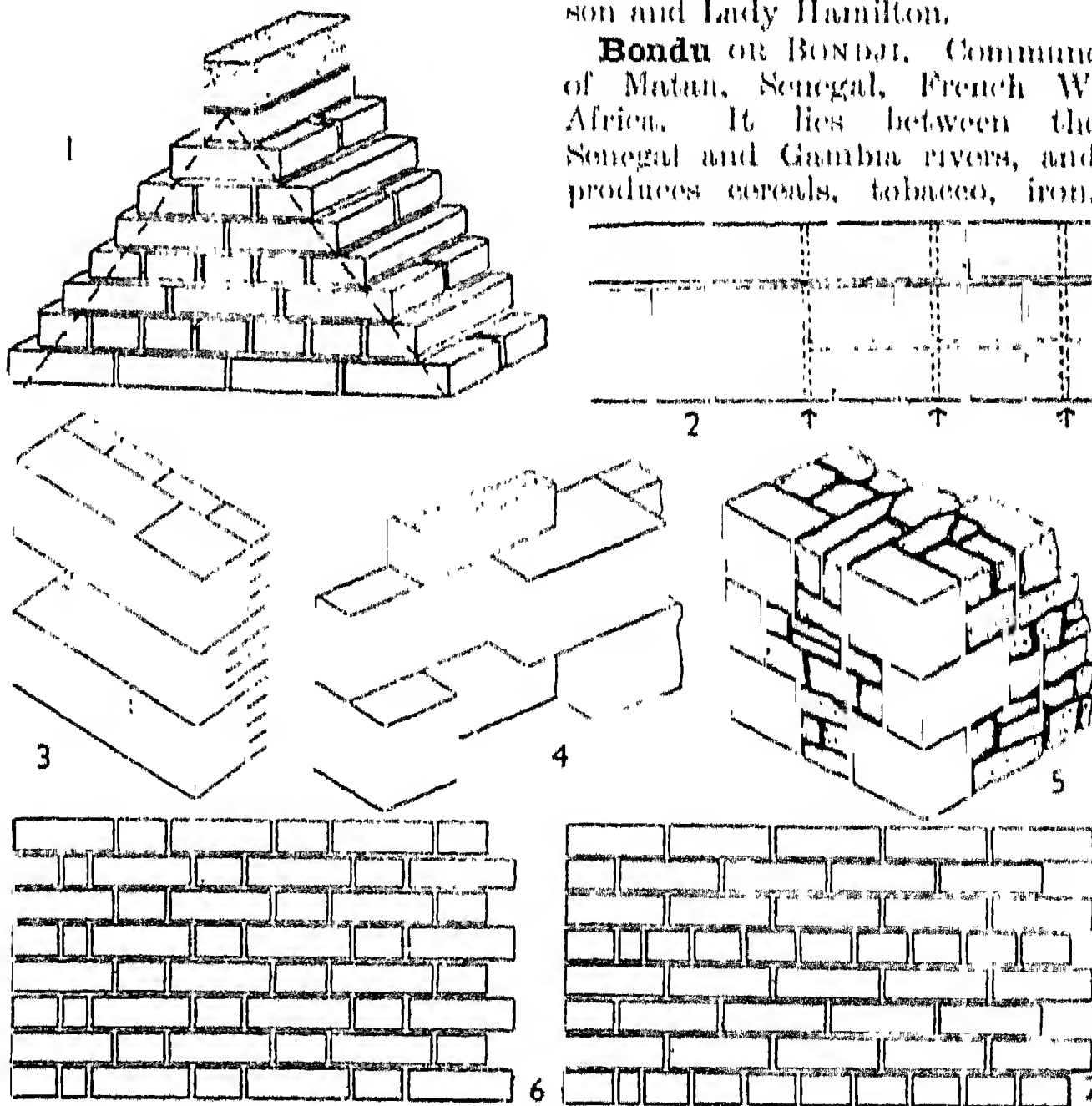
gonal lines show how the weight is distributed through the courses. Bonding in the thickness of the wall is illustrated by Fig. 2, the alternate course here being indicated in broken lines. It will be seen that the joints in one course come over or under the centre of a brick in the next course. In masonry the stones are similarly bonded in two directions (Figs. 3 and 4); when irregularly shaped stones (rubble) are used, the corners or quoins are formed of wrought stones (Fig. 5), this being an old method for very thick walls. Fig. 3 shows alternate courses of thin and thick stones, backed up with brickwork; Fig. 4 illustrates such stones used alternately in the same course. The masonry is generally only a facing nowadays.

The overlapping of the bricks produces a characteristic bond pattern on the face of the wall. Thus Fig. 1 is worked in English bond a whole row of stretchers (bricks laid *lengthwise* to the run of the wall) being followed by a whole row of headers (bricks laid with their longest dimension *across* the wall from front to back). In Flemish bond each course is composed of alternating headers and stretchers (Fig. 6). This diagram shows the left-hand end "stopped"

and the right-hand end "toothed" for continuing the wall. At the stopped end, of course, a whole brick must finish the wall either as a header or a stretcher, but the bonding is provided for by inserting here a half-brick (called a closer), as shown. English garden wall bond consists of three courses of stretchers followed by one course of headers, and so on (Fig. 7). See Brickwork.

Bond Street. London thoroughfare the E. boundary of Mayfair. A fashionable shopping centre, it is divided into two parts. Old Bond Street, laid out on the site of Clarendon House estate, 1686-88, by Sir Thomas Bond (after whom it is named), controller to Queen Henrietta Maria, runs N. from Piccadilly, while New Bond Street, built 1721, is an extension still farther N. to Oxford Street. It is the home of world-famous milliners, jewellers, perfumiers, art galleries, print shops, e.g. Cartier, Tiffany, Walpole, Finningan, Asprey, Atkinson, etc. In New Bond Street are the Aeolian Hall (which became a B.B.C. studio in 1943), and Sotheby's. Famous people who lived in Bond Street include Sterne, Sir Thomas Lawrence, Pictou, Boswell, Swift, and Nelson and Lady Hamilton.

Bondu or **BONDAL**. Commune of Matam, Senegal, French W. Africa. It lies between the Senegal and Gambia rivers, and produces cereals, tobacco, iron.



Bonding. 1. Distribution of weight in properly bonded brickwork. 2. Plan of 13½-inch brick wall with stopped end and correctly bonded. 3. Alternate thick and thin stone courses backed with brickwork. 4. Thick and thin stones used alternately in the same course. 5. Corner formed of wrought stones and rubble. 6. Flemish bond. 7. English garden wall bond

and some gold. It was annexed by France in 1858.

Bonduku. Region of the Ivory Coast, French West Africa. Though poorly watered, it produces cocoa, coffee, and manioc; and cattle and sheep are reared. The country is beautiful, and fine shooting is to be had. Area 18,350 sq. m. Pop. (1950 est.) 128,000.

One of its sub-divisions and the capital, which has an aerodrome, are also called Bonduku.

Bone. The hard part of the animal body or skeleton. When dried and freed from water, bone consists of about 67 p.c. of earthy constituents, chiefly calcium phosphate with smaller quantities of calcium carbonate, calcium fluoride, and magnesium phosphate; and about 33 p.c. of animal matter, mainly collagen, which is converted into gelatin by boiling. Two types of structure are recognized in bone: dense, compact bone, which forms the outer layers of a bone, and cancellous or spongy bone, found in the interior. The relative amounts of these vary in different bones and parts of a bone. In a long bone, such as the femur, the shaft is formed almost entirely of compact bone around a cavity, which is filled with marrow; the ends of the long bones, and smaller bones such as those of the wrist and ankle, consist almost entirely of cancellous bone covered with a layer of compact bone.

Haversian Canals

Microscopically, the structure of compact and spongy bone is essentially the same. When a transverse section of a long bone is examined under a high power numerous holes are seen, each surrounded by concentric layers, in which are small, more or less spindle-shaped spaces termed lacunae, communicating with each other by minute channels or canaliculi. On longitudinal section the holes are seen to be the cut ends of channels, or Haversian canals as they are termed from the name of their discoverer, Clopton Havers (d. 1702), which run parallel with the length of the bone and communicate with each other at frequent intervals. During life the Haversian canals are occupied by blood-vessels, and the lacunae by bone-cells. The surfaces of bone are covered with a strong, fibrous membrane, the periosteum, the blood-vessels of which communicate with those in the interior of the bone through the Haversian canals. Long bones are also supplied with blood through a nutrient artery which passes

through to the marrow, where it breaks up into smaller vessels. Bone is the framework of the body, and in the cavities of bones takes place the formation of red and white blood cells.

Development and Growth

Bone is developed in two ways: (1) by direct formation within a membrane which afterwards forms the periosteum, a method exemplified in the development of the bones forming the vault of the skull; and (2) by ossification of cartilage of which the bone is first formed, a process seen in the development of the long bones. Here also, however, the cartilaginous precursor of the bone is surrounded by a membrane, the perichondrium, which subsequently becomes the periosteum. After their formation bones grow by deposition of successive layers beneath the periosteum. When a piece of bone is removed in a surgical operation or is destroyed by disease or injury, formation of new bone will occur so long as the periosteum remains. If this also is destroyed, regeneration may sometimes be secured by transplanting portions of living periosteum or small pieces of living bone.

Fractures of bone have always been treated by opposing the broken ends. Great improvement in methods of opposing and fixation of the parts has been achieved. The aim is perfect fixation for the minimum necessary time with the minimum of muscular wasting: the latter is achieved by keeping in use all muscles except those actually moving the parts, and by tensing and relaxing even those muscles which work the broken bone. Plaster of Paris is not the most popular method of fixation. In many cases internal splintage is used, long flanged nails being introduced, as in fractures of the neck of the femur. This condition is frequent in old people whose bones tend to reunite very slowly, and for whom, therefore, perfect fixation of the bone is of the utmost importance. Internal splintage gives the extra rigidity which allows of muscular movement to prevent wasting.

A pin of non-corrosible metal run through a bone may allow careful traction to be applied, thus avoiding deformity. Plates of metal may be used to maintain fixation, and sometimes grafts of bone itself from another site in the same person are used. In cases where, because of wounds or other causes, large amounts of bone are destroyed, the missing bone can

sometimes be replaced by chips taken, most often, from the crest of the ileum (hip bone).

Tuberculosis may affect any of the bones and produce a condition termed caries, which most commonly occurs in the spine, and is a cause of spinal curvature. Syphilis in a late stage may also give rise to chronic inflammation of bone, followed by necrosis. Various forms of tumour, of which the most important is the sarcoma, may originate in bone. Secondary deposits of malignant tumours lodge frequently in bone. Rickets, mostly affecting children in cities, is a condition of the bone resulting in bending and weakening of the structure, and is caused by an error in the calcium and phosphorus chemistry of the body because of a deficiency of Vitamin D. Cod liver oil is the most valuable preventive and curative substance. Sunlight has the power to synthesise Vitamin D from the fat under the skin—a fact which long blurred the real cause of rickets.

Bône OR BONA. Town and seaport of Algeria, the ancient Hippone. It stands at the mouth of the river Sebus, 220 m. by rly. W. of Tunis, and has an airfield. From the time of Louis XIV until 1789 the French African company had factories here. There is an inner and an outer harbour. The town has flour mills; factories making chemicals, fertilisers, matches, olive oil, ceramics, furniture; distilleries; and food preserving plants. Iron, zinc, and copper ore, mercury, antimony, phosphates, sulphur, marble, gypsum, and porphyry are produced near by. Pop. (1954) 101,155. Bône was occupied by the French in 1832 and bombarded by the Germans in Aug., 1914. Allied troops landed here without opposition on Nov. 12, 1942.

Bone, HENRY (1755–1834). English enamel painter. Born at Truro, Feb. 6, 1755, and apprenticed to a porcelain works, on the failure of this firm he moved to London, where he found employment in enamelling watches and fans. In 1801 he was appointed enamel painter to George III. In the same year he was elected A.R.A., ten years later R.A. His greatest achievement was the series of 85 portraits of illustrious Englishmen, after originals in various galleries. In 1831 he became partly blind, and retired. He died in London, Dec. 17, 1834.

Bone, SIR MUIRHEAD (1876–1953). British etcher and draughtsman. Born at Glasgow, March 23, 1876, at 14 he was articled to an

architect but studied art in the evenings at the Glasgow school and at 18 devoted himself entirely to it. He began etching in 1898, and in 1899 went to London, where he scored some successes. After a brief retreat to Ayr in 1900, he settled in London in 1901. He began to hold one-man shows, and by 1906 was established as a draughtsman of talent and reputation. Bone's favourite subjects were complicated building works, demolitions, masses of shipping, and the like; and in integrating detail into an ordered design he had few or no rivals in his day. Spain gave him many subjects; and he did valuable work at the front and with the fleet in both Great Wars. He was knighted in 1937, and died Oct. 21, 1953.

Bone married Gertrude, daughter of Francis Dodd (*q.v.*). She was a writer of distinction; so also were Bone's brothers, James (b. 1872, C.H. 1947), who was London editor of the *Manchester Guardian* 1911-45, and Sir David (b. 1874, knighted 1946), master mariner. Muirhead illustrated some of their books for both his brothers. Muirhead's son, Stephen (b. 1904), was a painter of talent.

Bone Bed. Sedimentary rock made up chiefly of fossil bones and teeth. It may occur as a very thin layer covering a fairly wide area, when the concentration of fossil bones may be due to a pause in the supply of sediment: the best known examples in Great Britain are at the top of the Silurian system in the Welsh borderland, and at or near the base of the Rhaetic. Bone beds may also occur as small patches covering very limited areas, when rainwash or stream waters may have collected the bones into a surface depression, or in cave earths where bones of animals and their prey accumulate.

Bone-black OR ANIMAL CHARCOAL. Substance prepared by calcining bones out of contact with air. The bones are freed from grease by benzine and then placed in large iron retorts and heated for from six to eight hours. Bone oil and ammonia are given off and charcoal left behind in the retort. The bone-black is cooled in air-tight bins and afterwards crushed and graded by sifting.

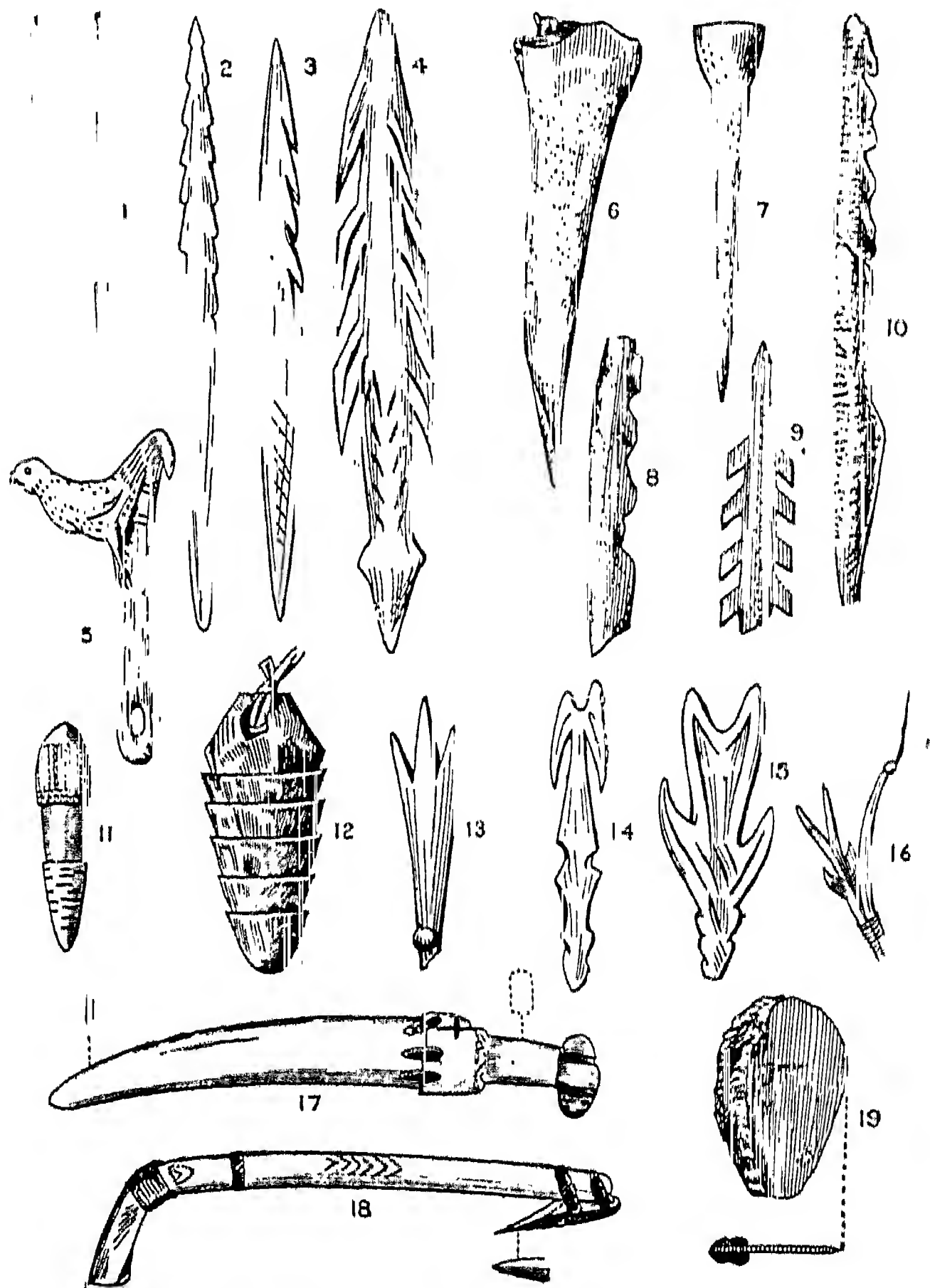
Bone Grafting. Replacement of shattered or destroyed bone by a graft of healthy living bone. The best results are obtained when the new bone is taken from the patient himself. Bone from another person may be used, however, and also bone from an animal. Usually the graft

is taken from the surface of the tibia, the larger of the two bones in the lower part of the leg. The graft should, if possible, be fixed firmly between the two ends of the injured or diseased bone. Sometimes, however, the graft is merely embedded in the soft tissues between the separated ends and growth occurs to fill up the gaps.

Bone Implements. Tools and weapons made of bone, especially in primitive cultures. Generically, the term also embraces tools made of horn, teeth, and ivory. The working of bone began in the Upper Palaeolithic age, and awls, shaft-straighteners, and spear-throwers (with engraved decoration), harpoons, eyed needles, and daggers mark the course of development in Europe. Some types persisted through the Mesolithic into the Neolithic age, during which many others were invented. Combs

occur in Danish kitchen-middens, and elsewhere are found chisels, hammers, picks, axe-sockets, arm-guards, spoons, pendants, and cheek-pieces for horse-bits. During the early metal age bone was used for sword-grips, tool-handles, box-panels, etc. Objects of bone and antler are numerous in early British sites: the Glastonbury lake-villages yielded 900. Many primeval types survive, especially among peoples who preserve the stone-age culture, *e.g.* the Australian aborigines, and S. African Bushmen.

Bone Manure. Valuable food and stimulant for many garden crops. Made from the crushed and powdered bones of animals it supplies the soil with phosphates. It is applied after a dressing of animal manure, for it provides the missing elements which the horse or cow has taken from its food, and therefore from the ground, and



Bone Implements of primitive man. 1. Needles. 2, 3, and 4. Harpoons. 5. Spear-thrower with carved head. 6 and 7. Awls. 8, 9, and 10. Harpoons. 11 and 12. Pegs. 13, 14, and 15. Fish hooks and, 16. method of attachment. 17. Snow-knife. 18. Gaff for salmon fishing. 19. Scraper for hides

which have gone to build its body instead of being returned to the soil in the orthodox form.

Ground bones form the base of many fertilisers, and are a valuable food for grass and pastures, helping to produce a rich velvety turf. For tennis and croquet lawns and bowling greens bone manure is invaluable, and it is a safe food under nearly all conditions for roses, fruit trees, peas and beans, root crops, and flowering shrubs. Crushed bones are usually dug into the soil, and ground bones dusted on the surface and watered in. This is a better plan than placing the bone manure in the watering-pots and cans, as bone meal, not being very soluble, is likely to form a sediment at the bottom of the utensil, and cause an unequal distribution of the nutritive properties of the manure. See Manures.

Bone Meal. Preparation from bones. It is made by mills containing toothed rings, toothed rollers, or beaters. The last-named type of mill is least satisfactory. Small mills with adjustable knives for cutting up green bones are much used for preparing food for poultry.

Bone Oil OR ANIMAL OIL. The volatile portion that is produced when bones are destructively distilled, as in the preparation of animal charcoal. It is also called Dippel's oil, from the inventor who, in the 17th century, first prepared it for use in medicine. The crude oil is a very complex body, as it results from the decomposition of fats and glycerin as well as the gelatin of the bones. Pyrrol is the most important constituent, and is used in the manufacture of colouring matters and of iodol, an iodoform substitute.

Bone Products. Bone, the framework of the fleshy tissues in man and animals, consists of organic and inorganic chemical constituents. The chief organic constituent is ossein, which yields gelatin on boiling with water. The inorganic constituents are practically identical in bones derived from different animals, as shown by the analysis of bone ash, the product obtained when bones are burnt. Bone ash contains about 85 p.c. of calcium phosphate ($\text{Ca}_3(\text{PO}_4)_2$) and 10 p.c. of magnesium phosphate ($\text{Mg}_3(\text{PO}_4)_2$), the remaining constituents consisting of calcium combined with carbon dioxide, chlorine, and fluorine. The value of bones for manure depends upon the calcium phosphate which they contain. During the Second Great War public salvage of bone, stimulated by posters, provided a rich source of industrial raw material.

The bone factory, where waste bones are made into manure and otherwise sorted for use in manufactures, requires to be situated away from a town on account of the unpleasant smells that are given off in the process of making manure, but railway or sea carriage facilities are essential. There must also be a plentiful supply of water.

Sorting and Breaking

The first process in the bone factory consists in sorting the bones before they are passed on to the crusher or cracker. Women are employed in sorting and in picking out extraneous matter. The marrow bones (thigh and big bones) are most prized, as they contain a high percentage of fat, and the bones are afterwards used for the manufacture of tooth-brush handles, buttons, paper-knives, and other bone articles. As the fat yielded by marrow bones is of a superior quality, these bones are generally treated apart from the smaller bones, and also are sawn into pieces, whereas other bones are passed through a crusher or cracker, as it is known technically. The breaking of bones is somewhat difficult on account of the toughness of the material. The apparatus most commonly used consists of two grooved or toothed rollers running into one another, driven by steam. The bones are crushed into pieces of various sizes, some machines being so constructed that bone of different degrees of fineness is separated. These are classified as $\frac{1}{2}$ -inch bones, $\frac{1}{4}$ -inch bones, bone meal, and bone flour.

Extraction of Grease

The next operation in the bone factory consists in extracting the fat from the crushed bones. This is carried out by boiling with water, when the melted fat floats on the surface, or in modern factories by dissolving out the fat by means of benzene, or solvent naphtha. The process of de-greasing bones, as it is called, by benzene is carried out in large iron tanks so arranged that steam and benzene can be admitted at will, and removed when needed. The necessary precautions against fire are taken, owing to the inflammable nature of the solvent. Steam is first admitted to melt the fat and then a stream of benzene is run through the mass of crushed bone. During the percolation of the benzene, the fat is dissolved. The fat-laden benzene is submitted to distillation to recover the benzene and separate out the fat. The fat which remains behind from this stage in the manufacture is further purified until it is sufficiently white and

odourless to be employed in the manufacture of soap.

The bones are next deprived of the gelatin they contain. The method is to subject the bones in closed vessels to steam at a high temperature. This dissolves the gelatin in the water yielded from the condensed steam. The gelatin solution is finally evaporated until of such a strength that it solidifies on cooling. The cruder product is known as glue, the purest product is called gelatin.

The degelatinised bones are now either made into manure or distilled for bone oil and animal charcoal. If for use as manure or dissolved bones, as this variety is called, the bones are treated with sulphuric acid, so that the calcium phosphate upon which the manurial value depends can be presented to the soil in a soluble form, i.e. can be utilised by the soil for the nourishment of plants. The apparatus is so arranged that the gases given off by the action of the acid can be removed, and, on account of their noxious character, passed into water towers, where the gases are dissolved and the water disposed of by running into the sewers. The dissolved bones are then mixed with a definite proportion of bone dust, with the object of drying the mass and absorbing any excess of acid. See Superphosphate; Gelatin; Glue; consult also Bone Products and Manures, T. Lambert, 2nd ed. 1913.

Boner, Ulrich. Medieval fabulist. A Dominican friar, he lived in Vienna in the 14th century and wrote a collection of 100 fables, *Der Edelstein*, chiefly adapted from the Latin fables of Avianus (4th century A.D.). Boner's work, the contents of which are remarkable for point and humour, was published at Bamberg in 1461, and was one of the earliest books printed in Germany with a date. Only two copies of the first edition are known. An edition by P. Kristeller appeared in 1908.

Bone-setting. Placing the parts of a broken bone in position for uniting. The term bone-setter is usually restricted to one who claims the natural power of reducing, by manipulation, dislocation, relieving ankylosis, and setting fractures.

Boneshaker. Name of an early type of bicycle, the first to have two wheels of nearly equal size. The rider propelled himself by pedals at the end of cranks mounted on the hub of the front wheel. The machine was made of wood and iron, and the wheels had no tires.

Bo'ness. Abbreviation of the name of the Scottish seaport Borthwickness (*q.v.*).

Bonfire. Term usually applied to a fire out of doors to celebrate a public or local event or serve as a beacon. The form "bonafire" was in common use till 1760, and it was long customary to destroy bones in this way. The practice of leaping through the flames figures among the rites of the Roman festival Palilia, celebrated May 1 in honour of Pales, goddess of shepherds. The Cornish bonfires may be a survival of Druid fires. These bonfires were, to some extent, countenanced by the early Christian church. On Guy Fawkes Day (Nov 5) the bonfire in Lincoln's Inn Fields, London, was an elaborate affair: sometimes over 200 cart-loads of fuel and more than thirty "guys" were burnt. See Beltane.

Bonga. Town of Abyssinia. In the dist. of Kaffa, which borders the Anglo-Egyptian Sudan, it is a commercial centre for the surrounding provinces.

Bongardia Rauwolfii. Tuberous-rooted perennial of the order Berberidaceae native of Syria and



Bongardia Rauwolfii, perennial tuberous-rooted plant from Persia. The rootstock, from which arise four or five leaves cut from edge to midrib into oblong lobes, resembles a small potato. The flower-stalks bear pyramidal clusters of small golden-yellow flowers. The tubers are cooked for food, and the leaves are eaten like sorrel.

"Bon Gaultier." Pseudonym under which W. E. Aytoun and Sir Theodore Martin collaborated in a series of verse parodies of their contemporaries which first appeared in Tait's or Fraser's Magazine, 1842-44, and were collected in a volume, *The Bon Gaultier Ballads*, 1855.

Bonghi, Ruggiero (1828-95). Italian author, scholar, and politician, born at Naples, March 20, 1828. At the age of thirty he brought out a translation of Plato. He was professor of philosophy at Pavia, of Greek at Turin, of Latin at Florence, and of ancient history at Rome (1870-95). From 1860 he sat in the Chamber of Deputies as



Ruggiero Bonghi,
Italian author

a supporter of the Right, and from 1874-76 he was minister of public instruction in the Minghetti Cabinet. An ardent Francophile, he vigorously opposed the Triple Alliance. His published works include critical studies of contemporary statesmen, and a *Life of Arnold of Brescia*. He died at Torre del Greco, Oct. 22, 1895.

Bongo. Negro tribe in Bah-el-Ghazal prov., Sudan, remnant of a formerly extensive people. They practise agriculture peacefully in small scattered villages and spend the dry season hunting and fishing. They seem to have originated in the Nile river basin, from which they were driven by invasions. Their poisoned arrows, and other cultural elements, suggest pygmy influence. Their ironworking is excellent.

Bonheur, Rosa (1822-99). French painter, born at Bordeaux, March 22, 1822. Her parents intended her to be a dress-maker, but at her earnest entreaties her father allowed her to take up art, and made himself responsible for her training. She first exhibited at the Salon in 1841, and her success was won by her animal painting. Her best known works include the famous *Horse Fair* (a replica of which is in the National Gallery), *Ploughing in the Nivernais*, *Hay-making in Auvergne*, *The Three Musketeers*, *Returning to Pasture*, and *Spanish Muleteers crossing the Pyrenees*. In 1894 the officer's cross of the Legion of Honour was conferred upon her, an unprecedented honour for a woman. She died in Paris, May 26, 1899.

Boni. Dist. of Celebes, Indonesia. In the S.W. extension of the island, it produces rice, sago, sugar, coffee, tobacco, cassia. The people, for the most part Bugis, are adept in metal work and cotton working. Buffalo and horses are reared. A vassal state of the Dutch E. India co. from 1668, Boni came under Dutch sovereignty in 1903. Area, 1,000 sq. m.; pop. 200,000. The town of Boni is on the coast; the gulf of Boni is an inlet formed by the southern peninsulas of the island of Celebes.

Boni, Giacomo (1859-1925). Italian archaeologist. Born at Venice, April 25, 1859, he travelled extensively through what were once the provinces of imperial Rome. He became superintendent of the

Venice Academy architectural school, then inspector of antiquities, and then, during 1898-1922, director of excavations in the Forum and on the Palatine hill at Rome. During his tenure of this office many important ancient monuments were unearthed; and excavation under the imperial levels near the Severan Arch brought to light structures probably associated with the *Lapis Niger* (black stone), the traditional tomb of Romulus. Under his supervision S. Mark's campanile at Venice was rebuilt in 1910. He published numerous official reports and a number of books on the antiquities among which he worked. He died July 7, 1925.

Boniface (680-755) English saint and apostle of Germany. Born at Kirton or Crediton, Devonshire, his original name being Winfrid or Winfrith, he was educated in monasteries at Exeter and Nursling, Hants, and was ordained priest in 710. In 716 he began the evangelisation of the Frisians and the German tribes, and then, summoned to Rome, was consecrated bishop in 723 and archbishop in 732.

In 741 he was appointed by the pope to reorganize the Frankish church, and worked as both missionary and reformer, especially in Hesse, Thuringia, and Bavaria. From 746-54 he was archbishop of Mainz, and then resigned the see and returned to his missionary work. With a band of converts he was massacred by pagans, June 5, 755 near Dokkum, in Frisia. Among his many foundations is the famous abbey of Fulda, where his remains were buried. He is commemorated in the calendar of the Church of England on June 5, and his festival was ordered to be celebrated throughout the Roman Catholic church by Pope Pius IX in 1874.

Boniface. Name of nine popes, of whom only two (VIII and IX) are noteworthy. Of the others, Boniface I was pope from 418-22; Boniface II, a Goth, was pope from 530-32; Boniface III only reigned a few months in 606; then Boniface IV was pope from 608-15; Boniface V, a Neapolitan, pope from 619-25, is mentioned by the Venerable Bede for his interest in the ecclesiastical affairs of England; Boniface VI, the nominee of a Roman faction, whose election was subsequently declared invalid, was only allowed to reign for 15 days in 896, and Boniface VII was an antipope who intruded himself in 974, and again in 984. He died in 985.

Boniface VIII (c. 1230–1303). Pope from 1294 to 1303. Born at Anagni, Italy, his name being Benedetto Gaetano, or Caetani, he became a doctor of law, and, created a cardinal in 1281, served as papal legate in France and Sicily. Elected to the papacy in 1294, on the resignation of Celestine V, whom he kept in confinement till 1296, his pontificate was characterised by vigorous insistence on the papal authority in civil no less than in ecclesiastical matters, and by the failure of his efforts. Sicily refused to accept a French ruler, and in 1296 chose Frederick, in defiance of Boniface, and Italy remained torn by civil war. In Rome itself the rebellion, 1297–98, of the cardinals of the Colonna family, who hated the pope for his exaltation of his own family the Gaetani, was defeated by Boniface.

In 1296 Boniface issued the bull *Clericis laicos*, which forbade the clergy to pay taxes without the Pope's consent, and this involved the papacy in disputes with Edward I of England and Philip IV of France. Boniface, who aimed at peace between England and France, hoping to organize a crusade against the Turk, opposed the taxing of the clergy in order to cut off supplies for the armies of Edward and Philip. In 1302 he promulgated the bull *Unam Sanctam* asserting the temporal supremacy of the pope, which made matters worse. He was taken prisoner by the French, at Anagni, Sept. 7, 1303, but was set free by the populace and died, Oct. 11, in Rome, which he had enriched in both art and science.

Boniface IX (d. 1404). Pope from 1389 to 1404. Born at Naples, his name was Pietro Tomacelli. He succeeded Urban VI as pope at Rome during Clement VII's pontificate at Avignon, and while his private life was without reproach, financial difficulties drove him to dispose of benefices and dispensations to the highest bidder. He made half the first year's income of every benefice a permanent payment to the papacy. He died Oct. 1, 1404.

Boniface, JOSEPH XAVIER (1798–1865). French story-writer and dramatist, better known by his pseudonym, Saintine, X. B. (q.v.).

Boniface. Character in George Farquhar's comedy *The Beaux' Stratagem*, 1707. He was landlord of the Lichfield Inn, in which several scenes were laid; his name is applied as sobriquet to the landlord of any inn.

Bonifacio. Fortified town on the S. coast of Corsica. It is 87 m. S.E. of Ajaccio and overlooks the strait of Bonifacio. Picturesquely situated on a peninsula sheltering a fine harbour, it has a citadel, a cathedral, a Templars' church, and an aerodrome. It exports olive oil, wine, cereals, and cork, and has coral fisheries. Pop. (1954) 2,157. Genoese 1195 until ceded to France 1768, during the Second Great War it was in German occupation 1942–43.

The strait of Bonifacio is a channel between Corsica and Sardinia in the Mediterranean. At its narrowest part it is 7 m. wide and navigation is difficult. Its waters contain oysters, tunny, and coral. It is the ancient *Fretum Gallicum*.

Bonin (Japanese, Ogasawara-jima). Group of 15 volcanic islands in the N. Pacific. They lie N. of the Tropic of Cancer, between Japan and the Marianne Islands, and are subdivided into three groups, Parry Islands, Beechey Islands, and Coffin or Bailey Islands, with a total area of 40 sq. m. Discovered in 1593 by Ogasawa Sadarjori, they became a British possession in 1827, reverting to the Japanese in 1876. Few of the islands are inhabited; the population consists chiefly of Polynesian half-breeds and Japanese settlers. Well wooded, the islands produce sugar and indigo, and also afford turtle and shark fishing. For long they served as a Japanese penal settlement. Port Lloyd, on Peel Island or Chichijima, is the chief harbour.

In the Second Great War, the Bonin islands were heavily fortified by Japan. They were attacked in force by carrier-borne U.S. aircraft June 14, July 3, Aug. 6, and Sept. 4, 1944; but no landings were made, the Allies bypassing them after the conquest of Iwojima (q.v.) in the Volcano Is. to the S. After the war the Americans remained in occupation of the Bonin islands.

Bonington OR BONNINGTON, RICHARD PARKES (1801–28). English painter. Born at Arnold, Notts, Oct. 25, 1801, he studied at the Beaux Arts, Paris, and under Baron Gros from 1820. His training was modified by visits to England, where he came under Constable's



Richard Parkes Bonington

influence, which he transmitted to the Barbizon painters. He was acclaimed at the Royal Academy in 1828 but died Sept. 23 that year. His subjects were landscapes and marines, generally with figures. He is represented in the National Gallery and Wallace Collection (notably by his *Henry IV and the Spanish Ambassador*), and in the Louvre and other galleries in Paris.

Bonito (*Katsuwonus pelamis*). Fish belonging to the tunny group, but smaller and more slender than



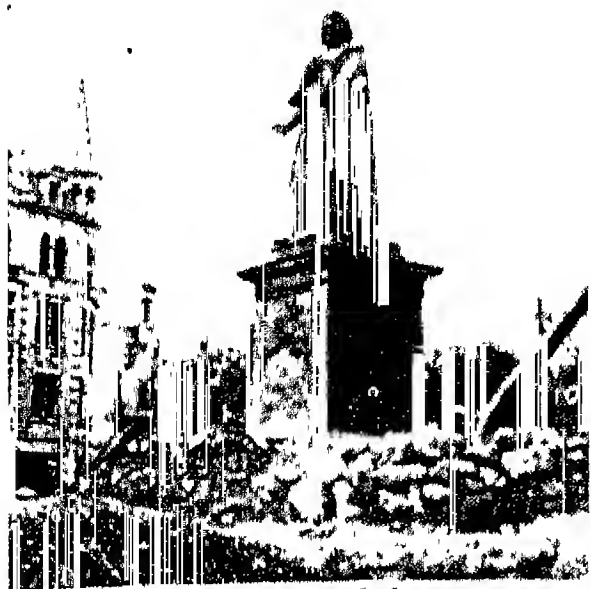
Bonito. A fish of the tunny group found in many seas

the common tunny. It is usually about a yard in length, is found in most seas, and follows ships for the refuse thrown overboard.

Bonivard, FRANÇOIS DE (1493–1570). French priest, historian, and scholar, immortalised as the original of Byron's *Prisoner of Chillon*. Born at Seyssel in Savoy, he was made prior of a Cluniac house near Geneva. He became involved as a partisan of Geneva in a dispute with the duke of Savoy, who imprisoned him twice, the second time in the formidable dungeon at Chillon, where he spent four years, and from which he was freed by his Swiss friends. Bonivard's best known work is *Chroniques de Geneve*, 1551, pub. 1831.

Bon Marché. French term meaning good bargain and taken as a name by various drapery businesses. The first was a large store in Paris (it went into liquidation in 1950), interesting also because it was long successfully conducted on cooperative lines.

Bonn. Town of Germany, capital of the (West) German Republic. On the left bank of the Rhine, about 15 miles S.S.E. of Cologne, it manufactures porcelain, machinery, cement, and chemicals, and has a transit trade along the Rhine. Apart from its university, its most interesting building is the minster, the earlier parts of which date from the 11th and 12th centuries; it was restored in the 19th century, and again after the Second Great War, when it was damaged. Among other churches was the Kreuzberg, once a famous place of pilgrimage. The house in which Beethoven was born, a museum containing many relics of the musician, escaped serious damage from Allied bombs.



Bonn is a residential town. It has a fine embankment, and a handsome bridge crosses the river to Beuel, an industrial district. The university, on the site of the elector's palace, dates from 1818; it has a good library, a museum, and an observatory, and is well equipped for the teaching of science, medicine, and agriculture, having been rebuilt after severe bomb damage in 1944. At

Bonn also there is a Roman Catholic theological college.

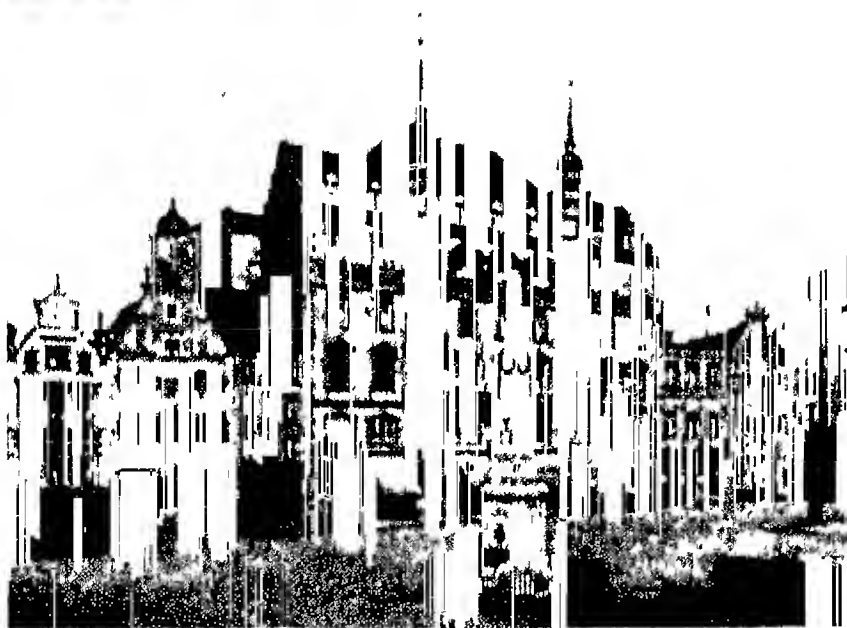
Bonn was a Roman station, and was destroyed by the Northmen. From about 1300 it was the residence of the electors of Cologne, who fortified and dominated it until 1794, when it was taken by the French. By the Vienna settlement, 1815, it became part of Prussia. Chosen in 1949 as capital of the recently formed (West) German Federal Republic, it grew rapidly in size and importance. New buildings included a parliament house and embassies. Pop. (1955 est.) 139,000.

Bonnard, PIERRE (1867-1947). French painter. A distinguished exponent of expressionism—the movement which in France superseded impressionism—he was unrivalled as a painter of domestic interiors, still life, and landscapes chiefly urban in character, but remarkable for their emotional intensity and masterly technique. In style Bonnard resembled his contemporary Vuillard, and in such works as *La Table* (Tate Gallery) his intention is to fuse objects in a harmonious whole. Many of his pictures are in private collections in Gt. Britain and the U.S.A. He died Jan. 24, 1947.

Bonnat, LEON JOSEPH FLORENTIN (1833-1922). French painter. He was born at Bayonne, and studied in Spain. France, and

Italy, after 1870 devoting himself to portraiture. Thiers, Renan, Presidents Carnot and Félix Faure, and Victor Hugo sat to him. He was awarded the Grand Cross of the Legion of Honour in 1900. He died on Sept. 7, 1922.

Bonner, EDMUND (c. 1500-69). English prelate. Educated at Pembroke College, Oxford, in 1529 he became chaplain to Cardinal Wolsey. Employed by Henry VIII as his envoy at Rome in 1532, in connexion with the divorce from



Bonn. Market-place and 18th century town hall. (Upper) Beethoven's statue, which survived the bombing of the Second Great War

Catherine of Aragon, he was sent on other embassies, being the king's representative in Paris in 1538. He was rewarded with various livings, and was made bishop of Hereford in 1538 and bishop of London in 1539. He was imprisoned 1549-53 under Edward VI and deprived of his bishopric for failing to enforce the use of the new Prayer Book, but was reinstated by Mary I in 1553.

The following year, after a rebuke from the crown for his leniency to heretics, he signed the condemnations of the Protestants sentenced to be burnt in London for heresy. After the accession of Elizabeth I he refused to take the oath of supremacy, and from 1560 was imprisoned in the Marshalsea prison until his death, Sept. 5, 1569.

Bonnet (late Lat. *bonnetus*, kind of fabric). Covering for the head, distinguished from the hat by being brimless. The bonnet is a development of the Roman *pileus*, a close-fitting, round or conical felt hat, chiefly worn by artisans. The bonnet of the Bible (Ex. 29) was a kind of turban.

Applied in Tudor times in Britain to flat caps worn by men, and still used for the velvet cap lining a crown or coronet, the word is chiefly used for women's head-dress, though in Scotland it still refers to the woollen caps fitting

closely over the head and ears, worn by peasants and, in the Lowlands especially, by the insular landowners who were called bonnet lairds. The bonnet of the Highlanders is perpetuated in the Glengarry as worn by the Scottish regiments in the British army.

The women's bonnet of modern times appeared in Britain first in the days of Elizabeth, when it was a cap stiffened with wires. Bonnets had a great vogue in the 19th century, but in the 20th they came to be associated with advancing age before passing out of general use. A plain, straw bonnet, called a poke bonnet, was for long the distinctive headdress of women of the Salvation Army.

The bonnet as worn in France, varieties of which were the *bonnet rouge* and the *bonnet de nuit*, corresponds rather to the British cap.

Bonnet, GEORGES (b. 1889). French politician. He was born at Bassillac, Dordogne, and adopted a legal career. In the First Great War he won the Croix de Guerre and Legion of Honour. Radical deputy for Dordogne in 1924, he was minister of finance in 1933, of commerce in 1935, and ambassador at Washington in 1937. Becoming foreign minister in 1938, Bonnet brought pressure to bear on Czecho-Slovakia to accept the Franco-British proposals for the settlement of the Sudeten German question. He was minister of justice, 1939-40, and a member of the Vichy govt. in 1941. After the war he published, from Switzerland, *Défense de la Paix*, 1946. In 1948 it was decided that he should be questioned in Switzerland by a commission of inquiry regarding charges of collaboration with Nazi Germany.

Bonnet Piece. Rare coin issued in Scotland in the reign of James V, about 1530. It is so called because on it the king's head is represented as covered with a bonnet instead of a crown. The coin was of gold, and is valued highly by collectors.

Bonnet Rouge. Red bonnet of Phrygian shape, called also the cap of liberty, worn by adherents of the French Revolution as a party sign. The French journal, *Le Bonnet Rouge*, was involved in a sensational treason trial; Duval, one of its managers, found guilty of accepting German money to advocate defeatist views, was executed in 1918.

Bonneval, COMTE CLAUD ALEXANDRE DE (1675-1747). French soldier. Born July 14, 1675, in Limousin, of noble family, he

served in the French army but in 1704, having been court-martialled and condemned to death for insolence to the minister of war, he fled to Germany and entered the imperial service in 1706. He fought against France, notably at Malplaquet, and against the Turks. In 1723 he lost favour with the prince, and was given a command by the Dutch Republic. Owing to his quarrelsome disposition he was banished; he went to Constantinople where he embraced Islam and took the name Ahmed. He distinguished himself in Turkish wars against Russia and Persia, and was made a pasha. He died at Constantinople, March 23, 1747.

Bonnie Dundee. Song, with words by Sir Walter Scott, which first appeared in *The Doom of Devorgoil*, 1830. It was adapted from an older song referring to the town of Dundee. Scott's Bonnie Dundee refers to Claverhouse. The lilting swing of the song perfectly describes the departure of Claverhouse from Edinburgh after defying the representatives of William III in 1689.

Bonnington, RICHARD PARKES. Alternative spelling for Bonington, under which heading this English painter is considered.

Bonny. River of Nigeria. An arm of the Niger delta, it flows S.E. into the Bight of Biafra. Its banks are swampy, except near the mouth, and it is navigable by ships drawing up to 18 ft. of water.

Bonny. Town of Nigeria. It stands on an island at the mouth of the Bonny river estuary, 80 m. E. of the Niger. It lies low, and is unhealthy. Palm-oil is exported. It was for centuries a centre of the slave trade.

Bono, EMILIO GIUSEPPE DE (1866-1944). Italian soldier. De Bono fought in the Italo-Turkish war, 1911-12, and throughout the First Great War, commanding an army corps in 1918. An early convert to fascism, he took part with Mussolini in the "march" on Rome, 1922, and was appointed chief of police and commander of the fascist militia. Governor of Tripolitania 1925-29, de Bono was for six weeks c.-in-c. during the Italian invasion of Abyssinia in 1935. He was promoted marshal and made inspector of Italian overseas forces, 1939. Tried for high treason at Verona, Jan. 8-10, 1944, by a court of Mussolini's "republican fascist govt.," he was condemned, and executed Jan. 11.

Bonomi, IVANOE (1873-1951). Italian anti-fascist politician. Born at Mantua, Oct. 18, 1873,

during the 1900s he published books advocating gradual socialism. In 1912 he was expelled from the Socialist party. He served as a volunteer in the First Great War. Deputy for Mantua 1909-24, he was during 1916-21 joint minister of public works, then war minister. He was prime minister 1921-22. With Count Sforza he negotiated the treaty of Rapallo, 1920. When Mussolini seized power in 1922, he retired.

During the German occupation of Rome, 1943-44, Bonomi was leader of the Roman committee of national resistance; and after the Allies entered Rome became, June 9, premier of a coalition govt. which took an oath not to the monarchy, but to the nation. This govt. lasted only until Nov. 26. On Dec. 10 he formed a new cabinet, resigning June 12, 1945, to make way for Ferruccio Parri, leader of anti-German resistance in N. Italy. He was president of the Senate, 1948, until his death in Rome, April 20, 1951.

Bonpland, AIMÉ JACQUES ALEXANDRE GOUJAUD (1773-1858). French botanist and traveller. He



Aimé Bonpland
French botanist

was born at La Rochelle, Aug. 22, 1773, and was some years an army surgeon. In 1799 he accompanied von Humboldt in his exploration of Central and South America, where he collected about 6,000 species of plants. He next became keeper of the gardens of the Empress Josephine, but in 1816 he became professor of natural history at Buenos Aires. Being suspected of espionage while travelling in Paraguay in 1821, he was detained there for eight years. On his release he lived in Brazil, and then in Argentina, where he died, May 4, 1858.

Bonspiel (Dutch *bond*, society; *spiel*, game). Curling match or series of matches between two rival districts or parishes. Ordinary matches between members of the same club are known as spiels.

Bony Fishes. The great group, or sub-grade, of fishes which have bone; known collectively as the *Osteichthyes*, in contrast to the cartilaginous sharks and rays, called collectively the *Chondrichthyes*. Of bony fishes now alive the vast majority belong to a single order, the *Teleostei*, in which the develop-

ment of bone is regarded as having reached a maximum. *Amia*, the bow-fin, the Coelacanth, representatives of supposedly extinct forms, and others are stragglers living on after the groups to which they belong, once dominant, have given place to the modern teleosts. In addition to the bony skeleton referred to in the name, most bony fish have scales, usually overlapping. Most also have swim-bladders and lay eggs which are fertilised outside the female by sperm from the male. They are found in fresh and in salt water everywhere, and there is some evidence that the present marine teleosts are derived from fresh water forms.

Bonze (Jap. *bonzo*, Chin. *fan seng*, monk). Term applied to a priest or, more correctly, to a monk of a bonzery, or Buddhist monastery, in China, Japan, and other parts of the East. Bonzes shave their heads, and wear robes with long and wide sleeves. Some earn a livelihood by teaching, and others subsist on charity, when the revenues of the pagoda or temple to which they are attached do not suffice for their maintenance.

Booby (Span. *bobo*, fool). Large sea-birds of the genus *Sula*, which includes also the gannets. They are said to be so called from the ease with which they can be caught. They inhabit the S. seas, and differ from the gannets of the N. by having a bare throat.

Booby. Rocky island in Torres Strait, off Queensland, Australia, in lat. 10° 36' S., long. 141° 53' E. It is dangerous to navigation, and has a lighthouse.

Booby Trap. Trap for the unwary. From the schoolboy's can of water balanced above a door, in such a manner that when an unsuspecting person opens the door the water is tipped over him, the booby trap developed into a military weapon during the closing stages of the First Great War, when the German army was in retreat. During the Second Great War all sides displayed ingenuity in causing an advancing enemy the maximum delay and confusion.

Retreating German and Japanese armies made desperate efforts to hold up the Allied advance with elaborate ingenuity. Food, toys, bottles of wine and beer, were left lying attached to mines fitted with pull switches, so that when the article was lifted the pulling out of a pin detonated the mine. Telephones, flush-chains, the covers of drinking-water containers, and even dead

and wounded bodies were booby-trapped by the Germans. A favourite booby trap in districts where there were fruit-bearing orchards was to fix egg grenades of the friction-fuse type in the trees; picking the fruit was sufficient to detonate the grenade.

Boodle's. London club named after the man who kept it when it was first opened in 1762. Purely social, it has about 800 members, and still retains something of its character as a club for country gentlemen. Its house is 28, St. James's Street, London, S.W.

Book (O.E. *bōc*). A collection of sheets of paper folded and bound together (see Bookbinding). Little is known of the beginnings of the book. Most of the materials on which early records were kept were perishable, e.g. leaves of trees, linen, leather; and only under such exceptional climatic conditions as those of Egypt have any of these materials endured. The records of ancient Asiatic civilizations written on clay tablets bear no resemblance to a modern book; but forming as they do a medium for the transmission of thought, they may perhaps be regarded as books in the extended sense of a literary production. When these tablets, containing hymns, love songs, scientific and legal texts, and history, formed a sequence of text, they were numbered, the number of the tablet and the name of the "book" to which it belonged being written on each tablet. The "books" were carefully indexed and cross-indexed, and arranged on shelves in convenient order.

But it is Egypt that may be considered the cradle of the book of today. Papyrus, prepared from the plant of that name, was the chief material used by the ancient Egyptians for writing their books, and in the Greco-Roman world also papyrus was for a thousand years the chief writing material. Early papyrus writings are in the form of a roll consisting of sheets sewn or pasted together and fastened at one end to a wooden rod, so that it could be rolled up; the preservation of many Egyptian books is due mainly to the fact that these manuscripts were buried in hermetically sealed tombs. But the roll was not convenient, especially for works much used for reference. It was not easy to collect information from different works, or to refer to particular passages in a large roll; to find a given section the whole work might have to be unrolled.

To overcome these difficulties the codex was invented. The co-

dex form may go back to the 1st century B.C., but no known documents are earlier than the 2nd century A.D. The codex form may have been a Christian invention, but if it was not it was adopted by the Christian community, and it was the growth of this community that led to the spread of the codex form, while during the 2nd and 3rd centuries A.D. pagan literature continued to be recorded on rolls, most Christian works were already written in codex form.

Making a Codex

Papyrus codices were bound like a modern book. A sheet of papyrus was folded in the middle, thus forming a quire of two leaves or four pages; by fastening together a number of such quires, a codex was formed. Or a number of such sheets might be laid one on top of another, and the whole folded so as to produce a multiple-quire codex. Examples are extant composed of as many as fifty-nine sheets, or 118 leaves. This form must have been very inconvenient, and a quire of 10 or 12 leaves became usual. Papyrus books ceased to be produced in the 4th century A.D.

ORIENTAL "BOOKS." The date of the invention of the Chinese "book" and its early history are unknown. There is reason to believe that already in the second millennium B.C. Chinese books existed, but they were written on perishable material which, in the wet climate of China, decayed very quickly. Silk, as a material for books, is mentioned by a number of writers of the 5th and 4th centuries B.C. The earliest preserved Chinese manuscript books belong to the 1st century B.C. and are written on thin, narrow strips of wood cut from sticks of bamboo and fastened together concertina-wise. The narrowness of these strips is said to explain why Chinese characters came to be written in vertical columns to be read from top to bottom.

Many later paper manuscripts on long sheets made up of several pieces joined together were folded concertina-wise into narrow pages, the reverse surface often being left blank, though both the Chinese and the Japanese also used a roll form of book similar to the western papyrus book. The scroll, indeed, seems to have been the main book form in China from the 5th until the 11th century A.D., and long after it had ceased to be used for books, it continued to be used e.g. for specimens of calligraphy, for maps, and for paintings.

From the rolled scroll the Chinese developed the folded book in which the scroll was folded at measured intervals concertina-wise and protected at the beginning and end with covers; a form that continued in use well into the 20th century, with the addition that its leaves were sewn at the right-hand side.

The two greatest contributions made by China to book-production are the invention of paper and of block-printing. The invention of true paper is generally assigned to A.D. 105, though some authorities put it much earlier. The earliest extant paper documents are written in Sogdian and belong to A.D. 313 or 314; the paper of these documents is made from rags of fabrics woven of Chinese hemp. The earliest Chinese paper book-scrolls, which belong to the 5th century, are made from the inner bark of a species of mulberry or from China-grass (ramie), or from a mixture of the two. All the varieties of this early paper are of wonderfully good quality.

At a later period the Chinese discovered a way to repeat designs by using a block of wood to make numerous impressions; this was the beginning of printing. How and when this block-printing was invented and how it developed initially is not clear, but the art of taking impressions from wooden blocks was practised at least as early as the 6th century A.D. Some two centuries later, the printing of books from wood-blocks became quite common. The earliest extant Chinese wood-block book belongs to A.D. 868.

Early Indian Books

Many thousands of Indian inscriptions carved or engraved on hard materials have survived, but relatively few documents written on perishable materials. The earliest extant Indian manuscript is written on birch bark, in Kharoshthi script: it is variously assigned to the 1st or 2nd century A.D. The earliest extant manuscripts on palm leaves belong to the 4th century A.D. The majority of extant Indian manuscripts belong to the 9th and following centuries. Most ancient Indian books are on Talipot palm leaves in the *pāṭhī* form, consisting of separate leaves not bound but tied together in a bundle. The leaves were laid one over the other and kept between two boards made of hard wood (sometimes beautifully ornamented). The "book" was united by a

cord or twine laced through two holes made in each of the leaves, as well as in the lower covering, and fastened to the covering by two knobs, often formed of some precious material.

DEVELOPMENT IN THE NEAR EAST AND IN EUROPE. Side by side with papyrus, another writing material, namely parchment, was for several centuries extensively used in the west. It was the most beautiful and suitable material for writing or printing upon that has ever been invented. The victory of parchment over papyrus in book production, which occurred in the first half of the 4th century, is due to the fact that the Christian Church, influenced possibly by Jewish practice, chose parchment as the material on which to write its sacred books. About the same time the emperor Constantine the Great proclaimed Christianity as the state religion of the Roman Empire; and the earliest extant codices of the Bible written on vellum belong to the 4th century: these are the Codex Sinaiticus, in the British Museum; the Codex Vaticanus, in the Vatican library; and the Codex Vercellensis (or Eusebianus), in the cathedral library, Vercelli, N. Italy; the first two are in Greek, the third in Latin. From these earliest codices to the spread of printing in the second half of the 15th century, the parchment codex dominated the field of book production.

Monks as Book Producers

The Christian monasteries were the main source of books in the Middle Ages. With the din of arms around him, it was the monk who, by preserving and especially by transcribing ancient manuscripts, as well as by recording in writing his observations on contemporary events, handed down knowledge to future generations. In the most important abbeys and monasteries a *scriptorium*, or writing room, was assigned to the scribes, who were constantly employed in transcribing not only Bibles and service-books for the choir and the church, but also books for the library and the monastery school, and even lay books. Two features of medieval book-production deserve particular study: illumination and binding.

During the 6th–8th centuries, when the vigour of the Latin Christian civilization on the Continent was exhausted in a bare struggle for life against invading barbarians, Ireland, at that time

unscourged by the invader, drew from its conversion to Christianity an energy such as it has never known since. The spread of Christianity was accompanied by rapid progress in letters and the arts, and Irish missionaries took Christianity and the art of producing Christian books not only to the Anglo-Saxons, but to such main centres of European monastic culture as Luxeuil (in Burgundy), Echternach (in Germany), St. Gall (in Switzerland), Bobbio (in Italy), and Peronne, Corbie, St. Riquier (in France). In the 7th and 8th centuries English Christian culture and learning spread to the Continent: the founders of the Frisian Church, the organizers of the German Church, the cultural adviser of Charlemagne, all were Englishmen. The twin monasteries of Wearmouth and Jarrow were not only the Christian intellectual centre of northern England, but also the most flourishing home of Christian scholarship in western Europe.

10th-Century Revival

Anglo-Saxon civilization, just as it began to rise, suffered a new blow and sank once more under the effect of the Danish invasions; but the 10th century brought a remarkable Christian revival (mainly associated with S. Dunstan) with the re-establishment of English monasticism, particularly in the south. It created an atmosphere favourable to the multiplication of religious books (psalters, gospels, benedictionals, pontificals, etc.). The excellence of these books was unrivalled in contemporary Europe, and in the early 11th century England was supplying books to foreign churches. Then came the Norman Conquest, and the end of Anglo-Saxon book production.

THE MODERN BOOK. Because of the high cost of the material used for writing on and of copying, the vellum codex could never enter into popular use. The introduction of paper into Europe and the spread of its manufacture, the invention of printing in Europe and its spread, and the industrial revolution—all combined to bring the book within the reach of ordinary people. For some time after the invention of printing the form of the book underwent no great change: it was the aim of the printer to produce books which in their aspect should not differ much from a manuscript. Even the type was at first similar to the book-hand in common use.

The early printed book contained no title page, but at the end of it was a colophon which gave the name of the printer, the address of the press, and other information. Early printed books were rather large and heavy. Continuous lessening through the following centuries in the cost of paper manufacture, printing ink, and printing has made possible the production of excellent books at popular prices. Consult *The Hand-Produced Book*, D. Düringer, 1953, and works listed in its bibliography; *The Invention of Printing in China and its Spread Westward*, Carter and Goodrich, 1955.

Bookbinding. The getting together of printed folios and enclosing them in a cover to form a book or volume. Bookbinding originated in the monasteries perhaps as early as the 1st century A.D. as the codex system of folded leaves, which displaced vellum or parchment rolls. Several folded vellum leaves were inserted one within the other to form a section, and a number of such sections were sewn together to make a book. The sections were sewn, one by one, to leather thongs which were fastened to a frame to keep them upright and taut. This type of sewing-frame is still used in hand binderies and the method of sewing survives for the best class of work. The first books were large folios covered with strong wooden boards cut to the same size as the leaves; the sewing thongs were pegged into the end boards. An iron ring was fitted to the lower cover so that the book could be chained to a reading desk.

The old monastic binding had several disadvantages: the flat back soon collapsed and became concave, so that the sewing was strained and the thread broke; as the leaves were untrimmed they bulged in an unsightly way on the front or fore edge; and the spine soon split with constant opening and shutting of the book. Improvements were made by gluing the spine and hammering it into a convex shape called the "round"; and the leaves were given better protection by projecting the cover boards slightly beyond their edges. This projection is current practice and is called the "square"; it varies from $\frac{1}{16}$ to $\frac{1}{4}$ in. according to the size of book and style of binding.

It became the practice also to trim the edges of the leaves after sewing. As this meant the thread could no longer be brought the full length of the sections but had to

stop short some distance from the head and tail, a link stitch was formed at each end called the kettle-stitch (from the German *ketteln*, to fasten with a little chain). The endbands, or headbands, were then sewn on separately after cutting. The leaves were trimmed by screwing the unbound book into a press so that the amount to be cut projected beyond the cheeks. A knife fixed to a carriage called a "plough" was moved backwards and forwards by a screw to cut the edge.

Experience showed that the boards tended to work backwards over the back, eventually tearing away the leather thongs and the thread from the sections. The rounded book was therefore screwed tightly into a press and the back was hammered to form a groove on each side, thus providing a hinge or buffer for the board. The process, called backing, continues in use.

The sewing was protected and the back given greater strength by covering it with leather. The ends of the headbands were cut off short instead of being laced into the covers, and the leather for the cover no longer had to be cut for the turning in of the headbands. To ensure that the leather cover stuck firmly to the back, it was tied down with cord on each side of the sewing thongs. The impressions of the cords on the damp leather were often used as the basis for subsequent decoration. Metal protecting bosses were fitted to the corners of the covers, and books were still chained to reading desks. As books became more plentiful, both the metal bosses and the chains were discarded.

Effects of Printing

With the invention of printing it was possible to produce smaller books for which heavy wooden covers were no longer necessary. Instead, covers were made by pasting together waste sheets of paper and pressing them; but basically the principles of bookbinding changed little after the 15th century, such changes as there have been being for the most part through the invention of mechanical devices to replace manual operations.

Since the early days of bookbinding in leather, covers have been decorated by heating metal hand stamps and impressing them on the damp leather. At the end of the 15th century the art of gold tooling was introduced into Europe from the Far East.

Binding by hand entails building up the cover around the book itself. No machine can do this, but the introduction in the mid-19th century of a form of mechanised bookbinding called "casing" laid the foundation for the mass-production of books. In this process, the cover or case is made separately by machinery; the book sections or "signatures" are gathered together, sewn, rounded, backed, lined for strength, and headbands are put on, all these operations being performed entirely mechanically. The case and the "book block," as it is sometimes called, are married by an operation called "casing-in." Although not so strong as hand-binding, bookbinding in this fashion is effective enough for average use.

Leather, which continues to be used for expensive bindings, has long been displaced as a common cover material by starch-filled cloth, a material eminently suitable to "blocking," that is, decorating with metallic foils or inks on an automatic press. Strong felted-fibre cover paper suitable for preprinting is often used for cheaper books.

"Unsewn" Binding

Started in the early part of the 20th century, and increasingly favoured with the invention of synthetic glues, "unsewn" binding is another form used in the mass-production of paper-backed novels and cheap eased books intended to have a limited life. In this method the folds of the signatures are cut off and a coating of durable plastic adhesive is applied to the back of the book.

The strength of modern bindings is due to components different from those used in hand binding—so much so that imitation tapes are stuck to the backs of the sections, and headbands are glued on simply for decorative effect. The work of the hand binder is less in demand than it used to be, but his craftsmanship is still needed for the binding of individual books and for the restoration of old volumes in museums and in university and national libraries. *Consult* History of Bookbinding, J. Brassington, 1894; Bookbinding and Ruling, J. Mason, 1935; Bookbinding and the Care of Books, D. Cockerell, 5th ed., 1953; The Literature of Bookbinding, W. Hobson, 1954.

Book Collecting. The practice of collecting books which are of exceptional interest and at the same

time so scarce as to be difficult to obtain. Some books have a value as marking a stage in the history of printing, *e.g.* the famous Gutenberg or Mazarin Bible (the first printed Bible, 1456) for which £3,800 was given at Sotheby's in 1911. High prices are also paid for productions of Caxton, the first English printer. Other books are valued as examples of beautiful binding.

The rarity of a book is the chief factor in determining its value, and the rarest books are often those which were cheapest when they were first published since, being cheap, they were not prized at the time they were published; Shakespeare quartos, sold for 6d. when they first appeared, have fetched £2,000 for a single play.

A particular book may owe its value to the eminence of its original owner, or to the fact that it is an inscribed presentation copy; and a book annotated by its author often fetches a high price. Surviving copies of a book that has been suppressed acquire an enhanced value.

Book collecting seems to have begun in Italy in the 15th century. In England, the practice may be said to have started with the efforts of book-lovers, *e.g.* Archbishop Parker and Sir Robert Cotton, to rescue some of the contents of the monastery libraries scattered at the dissolution of religious houses under Henry VIII. Early printed books began to appreciate in value during the 17th century.

Famous Book Collectors

Among noted British collectors have been the 3rd earl of Sunderland (1674-1722), Richard Rawlinson (1690-1755), Horace Walpole, 4th earl of Orford (1717-97), John Kerr, 3rd duke of Roxburghe (1740-1804), Thomas Grenville (1755-1846), 2nd earl Spencer (1758-1834), Richard Grenville, 1st duke of Buckingham and Chandos (1776-1839), 6th duke of Devonshire (1790-1858), 4th earl of Ashburnham (1797-1878), Alexander Lindsay, 25th earl of Crawford (1812-80), Henry Huth (1815-78), 1st Lord Acton (1834-1902).

Regular book auctions, started in 1676, continue to offer the chief field to the collector; and bargains are still occasionally to be picked up by those with the necessary knowledge and discrimination. Old bookstalls yield little to the amateur, for they are systematically ransacked by agents

of second-hand booksellers; but collections of lumber in old country houses sometimes afford unexpected treasures. *Consult Book-Collecting as a Hobby*, P. H. Muir, 1944; *The Book Collector's Vade Mecum*, A. Black, 1944.

Book-keeping. Systematic record of financial transactions in the form of accounts (a) classifying income and expenditure under significant headings; (b) for property and other assets owned; (c) of trading and transactions with other firms or persons giving rise to debts due to or by the proprietor, and their settlement. Book-keeping was practised in very early times; the merchant houses of Italy used a form of double-entry book-keeping in the early Middle Ages and the practice was spread by them as their trading extended. It is believed that the double-entry method of book-keeping was taught orally in schools in Italy, and also by the use of manuscript guides or sets of rules. In 1494 appeared the first printed book on the subject written by an Italian monk, Luca Pacioli, and forming part of a larger work on mathematics, entitled *Summa di Arithmetica, Proportioni e Proportionalica*. It was followed during the next century by a number of printed books on the subject bearing so close a resemblance to Pacioli's work as to have been thought at one time to have been translations of it; on the other hand, they may have derived from another but similar manuscript source. In England the first book on book-keeping, by Hugh Oldcastle, was published in 1543; in 1547 came a translation by an unknown translator of a Dutch book by Impyn Christoffels; no copy of either of these books is extant, and the first book in English known to have survived is one written by James Peel, clerk to Christ's Hospital, in 1553, and called "The manner and fourme howe to kepe a perfect reconyng after the order of the most worthie and notable accompte of Debitour and Creditour etc." After this came numerous books, many written by teachers of arithmetic, most of whom based their teaching on the Pacioli system.

The Pacioli system provided for three principal books to be used: (1) the waste book or memorial book in which a narrative of the transactions was entered quickly and more or less roughly, as they occurred; (2) the journal in which the transactions were entered in

book-keeping form showing the accounts to be debited and credited; (3) the ledger containing the actual accounts, including accounts with the bank and for cash.

Introduction of Day Books

As time went by, the journal proved too cumbersome in use, and the record of items affecting the bank account and the sales and purchases of goods was in the main repetitive. For this reason groups of similar transactions began to be passed through separate journals or day books in which one side of the transactions was posted in detail to the personal accounts affected, the monthly total being then posted in one figure to the sales or purchase account; the cash book provided a complete record of transactions with the bank, displaying the balance in hand or overdrawn.

Typical Trading Books

The book-keeping scheme of a typical trading business accordingly became:

(1) An impersonal ledger, containing the accounts recording income and expenditure, proprietor's capital and drawings, and any private loans, mortgages, or similar accounts. This book is sometimes divided into a private and a nominal ledger. It also contains control accounts for the other ledgers.

(2) A debtors or sales ledger, containing the accounts with customers of the business.

(3) A creditors or purchases ledger, containing the accounts with those persons supplying goods to the business.

These three are all classified subdivisions of the ledger kept under the earlier system.

(4) A sales day-book, recording the sales on credit as shown by the invoices to customers. Individual sales are posted to the debit of the customers' accounts in the debtors' ledger and the monthly total to sales account in the impersonal ledger.

(5) A purchase day-book, recording the purchases on credit as shown by the invoices from suppliers. Individual purchase items are posted to the credit of suppliers, and the monthly totals to the debit of the purchases account in the impersonal ledger.

Both sales day-book and purchase day-book might have analysis columns so as to provide separate totals for sales and purchases classified under departmental headings.

When goods are returned by customers or to suppliers frequently, it is advisable to use a

returns inwards and a returns outwards day-book.

(6) Cash-book. This records amounts received and paid into the bank and cheques drawn, and also the balance from day to day. Postings are made from this book to the various personal and other ledger accounts. Small cash expenditure is recorded in a petty cash-book and made from a float provided for that purpose and replenished from time to time by a cheque drawn on the bank account. Where goods are not sold on credit, cash sales will be recorded in the cash-book, which is provided with suitable columns.

The accuracy of the book-keeping process is checked by the extraction of a trial balance.

Mechanical Aids

Book-keeping records were formerly prepared by hand but accounting machines and other mechanical aids are increasingly used. These are of three kinds:

(a) Those which do not use a typewriter but merely provide a method for taking several copies of handwritten documents at one operation. Under this system, for example, by means of carbon copies and suitably arranged peg boards, when a remittance is received from a customer at one operation his receipt is made out; a carbon entry is made on a cash-received slip that forms part of the cash book, on a bank paying-in slip, and in the ledger account. Daily totals are calculated separately, and the entries in the ledger account can be checked and agreed in total daily. Sales invoices are similarly dealt with, the sales day-book, the entries in the sales ledger account and in the monthly statement being made in one operation.

(b) Accounting typewriters, which are essentially the same in principle except that these can be used to carry out a very much greater volume of transactions, including analysis and similar work not suitable for operation by handwritten methods. They are also provided with adding boxes which record mechanically the totals of the items posted by the machine, will print the totals on depression of a key, and will automatically add or subtract an amount posted from the existing balance on an account and print the new balance. A firm's cheques can be written by such a typewriter, providing at the same time a suitably arranged carbon copy to form the cash-book and an advice of remittance to the payee,

and giving an automatic total of the cheques drawn during the day.

(c) Those which are based on the punched card. Under this system each transaction is recorded on a card by means of holes punched in it according to a code or pattern. From the cards relating to a day's sales, for example, the daily list of sales can be produced automatically, sub-divided, if required, into departmental sales totals; total sales of individual types of goods can be produced for stock records; totals for individual salesmen can be ascertained for calculation of commission, etc.; and the postings can be made to the debtor's personal ledger accounts (or cards) and monthly statements. The operation is first to analyse the cards under these main and subordinate classifications, and then the information is printed on the list or account as required, all these operations being carried out mechanically. This type of machine is of particular use in connexion with stores records in large works. Both the accounting typewriter and the punched card system are too costly to instal except where the volume of transactions is large.

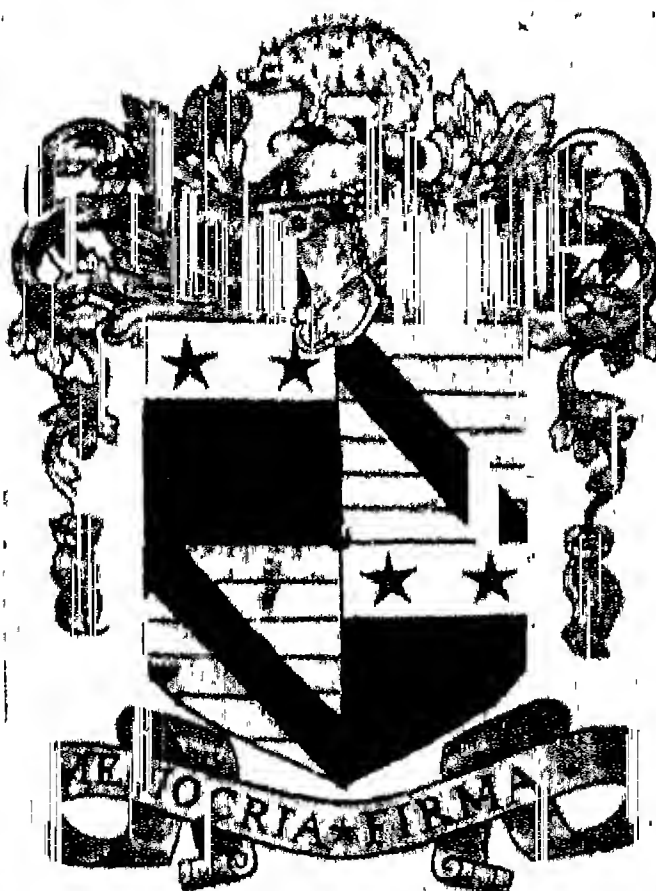
Book League, NATIONAL. Organization composed of publishers, booksellers, authors, libraries, schools, and readers for the promotion of the sale and use of books. Inaugurated in 1944, it developed out of the National Book Council, founded 1926. Its h.q., at 7, Albemarle Street, London, W.1, includes club premises for members and rooms in which exhibitions relating to books and their production are held.



Book-plate designed by Albrecht Dürer for Wilibald Pirckheimer, 1524

Book of the Dead. Ancient Egyptian work. This Book of Coming Forth by Day (Per-em-Hru) comprises magical formulas, hymns to Osiris, and directions for the soul's journey through the underworld of Amenti. The earliest funerary texts are found on the walls of Old Kingdom pyramids, and embody primitive animism. During many centuries substantial changes were made, and new chapters added, to mark the growth of religious thought. The Per-em-Hru is a recension of this older material which was made at Thebes during the XVIII dynasty. It is usually written on papyrus and often magnificently illustrated, one of the finest being the Ani (*q.v.*) papyrus in the British Museum. Selected chapters were written on mummy-wrappings, heart-scarabs, and amulets. No complete copy is extant: the longest, of the Ptolemaic age, is at Turin; it has 165 chapters. Consult *Ancient Egyptian Religion*, J. Cerny, 1952.

Book-plate. Label, printed or engraved, heraldic or otherwise, in-



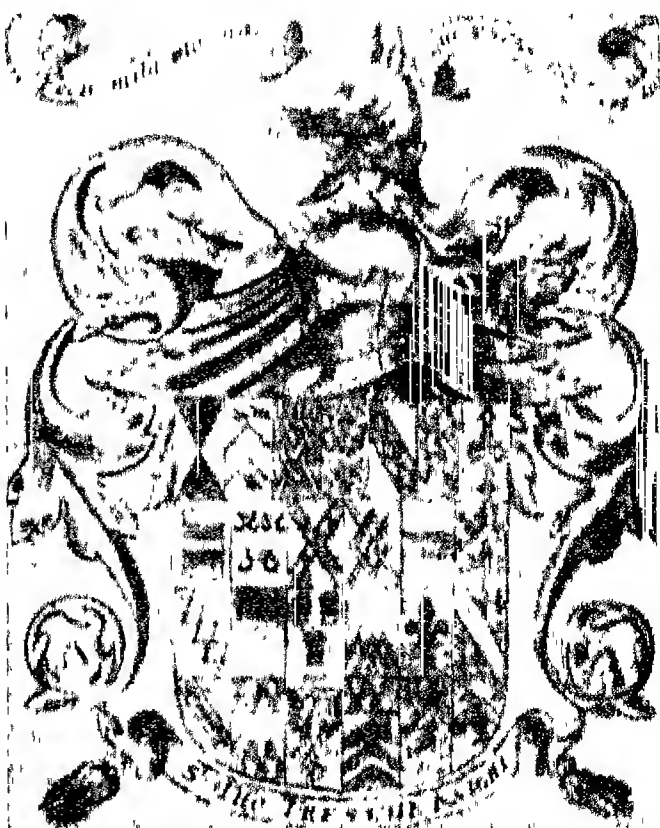
*N. Bacon eques auratus & magni
figilli Angliae Castellor librum hunc bi-
bliothecae Cantabrigie dedit.*

1574.

Book-plate designed for the books
given by Sir Nicholas Bacon to
Cambridge University in 1574

tended to proclaim the ownership of a book. This label is generally pasted on the inside of the front cover, but some bibliophiles prefer the back of the title-page, or the inside of the end cover. According to Leicester Warren, Lord de Tabley, the word book-plate is technically the exact equivalent of the Latin *ex libris* (from among the books), the phrase adopted by collectors and the Ex Libris Society.

The oldest known book-plate is a crude German woodcut of about 1450, but the examples ascribed to Albrecht Dürer are more appropriate and more dignified, one of the best being that of 1524 designed for his friend Wilibald Pirckheimer, the Nuremberg lawyer, bearing the aphorism, *Inicivm Sapientiae Timor Domini* (the fear of the Lord is the beginning of wisdom). In England the book-plate dates from the time of Sir Nicholas Bacon (1509-79), who had a plate engraved on wood and hand-coloured for the books he presented to Cambridge University in 1574.



Book-plate. Early armorial design
made for Sir Thomas Tresamo, Kt.,
1585

Book-plates have been divided into the following classes: (1) Early Armorial (Tudoresque, Caroline, and Restoration); (2) Georgian (Jacobean or Grinling Gibbons, Rococo or Chippendale, and allegoric, or festoon, or wreath and ribbon); (3) Modern Armorial (Heraldic); (4) Fanciful, or pictorial (books piled, library interiors, portraits, allegories, landscapes, emblems, seals, printers' and publishers' marks, and genre).

The simplest form of plate gives merely the owner's name in type or autograph, but armorial bearings were formerly widely affected until a time came when the designer was allowed a free hand. Armorial and portrait plates are the most attractive. Both Hogarth and Bartolozzi were noted for their designs.

The early years of the twentieth century saw a revival in the use of the book-plate, often bearing instead of a coat-of-arms some indication of the owner's hobbies, occupation, or background; and the exchange of book-plates among friends introduced a new form of collecting.

Bookselling. Despite fanciful claims reaching back into scriptural times, there is no evidence that bookselling, as a form of trade, became established much before the time of Alexander the Great, in the 4th century B.C. With the decline of Athens, the book-trade thrived in Alexandria and, much later, following political and cultural migration, publishing and bookselling became established in Rome, where it began to take forms suggestive of those of today. At first there was no clear division of function between the production and the selling of books, these being merely succeeding stages of a process.

Bookselling languished during the so-called Dark Ages, such books and manuscripts as were produced being guarded in monasteries and libraries. Materials were hard to come by, and it is on record that monks frequently cut the unused margins from books already in their libraries in order to produce more books. European bookselling took shape with the rise of the medieval universities. The stationers, as they were then called, acted mainly as agents on commission for authors and manuscript owners. The university authorities kept a very close check on them.

With the rise of paper-making and of printing, there came the tendency for book production to be divorced from marketing. There is evidence that, in the time of William Caxton, the first English printer, a system of "on sale or return" was operating. Much travelling was done by booksellers in the course of their business, and the medieval fairs were an important market. In England, Stourbridge Fair in particular maintained a great tradition in the selling of books, its "booksellers' row" surviving into the 18th century. In Frankfurt-on-Main, which from the earliest days of printing had established itself as the centre of an international book trade, there grew a highly organized twice-yearly book market which attracted retail booksellers from all parts.

New and Second-Hand

By the 16th century there were clear fields of authorship, printing and publishing, and marketing; and in time specialisation developed in bookselling itself. A distinct division exists between the sale of new books and of second-hand books. Many traders engage in both lines of business; but the technique and the economics of the two kinds of bookselling are different, as are the potential markets.

Trade in second-hand books is probably, in most people's estimation, the more attractive. The half-musty, ancient smell of old paper and of leather bindings, and the ever present chance of finding some bibliographical treasure hidden among many worthless volumes, bring to antiquarian bookselling a romantic air which obscures its economic structure. It is a calling that attracts the scholar and the amateur; fortunes and careers have been made and lost in it, and it is frequently more adventurous than the more strictly commercial enterprise of selling new books. The finances of antiquarian bookselling are concerned chiefly with scarcity values and the capacity and inclination of the customer to pay the price.

"Net Book Agreement"

The sale of new books alone is seldom sufficiently remunerative to offer a livelihood; and the competition through price-cutting practised during the 19th century put many booksellers out of business and into the bankruptcy courts. Several unsuccessful attempts to form an association that would protect booksellers from the effects of this form of competition were made before, in 1901, newly-formed associations of booksellers and of publishers reached what was called the "net book agreement." Under this, a publisher who chose to specify his publications as "net" could be assured that booksellers would honour the price he had fixed, and not attempt to undercut other booksellers. Publishers and booksellers later made many agreements aimed at improving the structure of the trade, until by the middle of the century a would-be bookseller needed trade recognition before he could obtain regular supplies of new books from publishers. But the strong bias against monopolistic activities which developed in the 20th century led to the passing in 1956 of the Restrictive Trade Practices Act, the effect of which was to make all such restrictions illegal.

To be of service to a community a bookshop must carry a fairly large and attractive stock; but it is not generally realized that nearly all the books exhibited in a bookshop have been bought by the bookseller, and those that fail to sell represent a loss to him, for he cannot return them to the publisher. When a publisher announces a new work and sends his travellers round the country to the bookshops with details about it

the bookseller has to consider carefully his prospects of selling it before he decides upon buying. If he settles for six of a particular title, he will have to sell at least four to cover the cost of the consignment. From the sale of the other two he must pay the overhead expenses of his shop, his assistants' wages, and himself; he must also realize enough capital to reinvest in further titles. Bad judgement in buying will therefore quickly lead to failure.

The bookseller may be held equally responsible with the publisher and the printer if he allows himself to offer for sale books containing matter that the law decides is obscene or seditious (*see under* Obscenity; Sedition). The Booksellers Association of Great Britain and Ireland, founded in 1895, supports the work of booksellers, and backs a scheme for the training and examination of bookshop assistants; its h.q. is at 14 Buckingham Palace Gardens, London, S.W.1. The periodical *The Bookseller*, 13 Bedford Square, London, W.C.1, is devoted to matters of interest to the trade. The National Book League (*v.s.*) was established to stimulate public interest in the buying of books; and the book token scheme (*v.i.*) encourages the giving of books as presents. Reviews of books in the daily and periodical press, and on the radio, and the presentation of films, stage plays, and broadcast plays based on books are other forms of free support received by the book trade, which follows very similar lines in all the countries of the West.

Bibliography. *The Earlier History of English Bookselling*, W. Roberts, 1889; *Publishing and Bookselling*, F. Mumby, 1930; *Best Sellers—Are They Born or Made?*, G. Stevens and S. Unwin, 1939; *The Business of Bookselling*, J. G. Wilson, 1945.

Book Society Ltd., THE. Organization founded in 1929, the counterpart of the Book of the Month Club of the U.S.A. which began distribution in 1926. Its object is to encourage the buying of books. A selection committee chooses each month for ten months of the year a book of fiction, biography, travel, etc., that it considers the best work published during that month; and recommends also some dozen other new books. Members undertake to buy from the society month by month either the book chosen as best or some other book on the list. The office is at 13 Grosvenor Place, London, S.W.1.

Book Token. Voucher that can be purchased in certain bookshops in the U.K. and exchanged for a book in the same shop or in another operating the scheme. Designed to encourage the purchase of books as presents, book tokens proved popular with givers and receivers because they make possible the gift of a book of the recipient's own choice. The scheme was started in 1932 at the suggestion of Harold Raymond, a member of the publishing firm of Chatto & Windus. The token is a decorative card to which the issuing bookseller affixes a voucher of the desired value. A subsidiary scheme of Book Tallies, worth 6d. each and issued in series of 12, lasted 1949-53; purchase tax levied on the cards killed it. The h.q. of Book Tokens Ltd. is 14, Buckingham Palace Gardens, London, S.W.1.

Bookworm. Larva of small beetles of the family Anobiidae, especially *Plinus fur*. Some bore holes in all directions through a book, others confine their attentions to the covers.

By a natural extension, the term bookworm is applied to one who spends much time reading—especially by schoolboys as a term of opprobrium to a fellow student devoted to his books.

Boole, GEORGE (1815-1864). British mathematician and logician who first developed a technique for the mathematical investigation of the process of reasoning. He was born at Lincoln on Nov. 2, 1815, and brought up in poverty, but he taught himself Latin, Greek, French, Italian, and German, and became a schoolmaster, opening his own school when he was 20. To fulfil his duties he studied mathematics and immediately found his vocation. He first worked in algebra, but his distinctive achievement began with the publication in 1847 of a pamphlet, *The Mathematical Analysis of Logic*, in which De Morgan recognized Boole's genius.

In 1849 Boole became professor of mathematics at Queen's College, Cork, and in 1854 he published *An Investigation of the Laws of Thought*, embodying the principles expounded in his earlier pamphlet—a work described by Bertrand Russell as the work in which "pure mathematics was discovered." In it Boole developed the algebra appropriate to logical reasoning. He died Dec. 8, 1864. Boolean algebra plays a vital rôle in the theory of sets

and in the study of switching circuits.

Boom. Gorge of the river Chu, in the Frunze region of Kirghiz S.S.R. Construction of the Orto-Tokoy reservoir in Boom Gorge and completion of the Great Chu canal, to provide water for irrigating the pastureland of the Chu valley, were scheduled for completion under the 6th Five-Year Plan, 1956-60.

Boom (Dutch, beam, pole). Any long spar used on a ship. In sailing vessels a boom is run out from the lower section of the mast to hold a sail; it is called jib-boom, studding-sail boom, etc., according to the position in which it is used. The long spar run out at right angles to the side of a ship and from which the crew drop into small boats lying alongside is also called a boom.

The term boom is applied to the defensive barrier laid across rivers and harbour entrances as a protection against naval attack. Sometimes a boom is an offensive weapon, as when laid across a harbour in order to prevent an enemy fleet from putting to sea.

In its early form a boom consisted of heavy balks of timber held together by chains and wire hawsers, and stretching from side to side of the entrance to the defended harbour. Such defences could generally be overcome by determined attack, as when the Dutch fleet which raided the Medway in 1667 forced the boom thrown across the Thames. In 1680 the Mountjoy raised the siege of Londonderry by breaking through the boom laid across the Foyle. Booms have frequently been "jumped" by small craft,

all movable weights being collected aft to bring the bows of the vessel out of the water and then moved forward again with all possible speed as the craft's impetus carried her over the obstruction. Even the strongly built booms developed in the second half of the 19th century could be forced: the torpedo-ram Polyphemus broke through a heavy boom at Berehaven in 1885

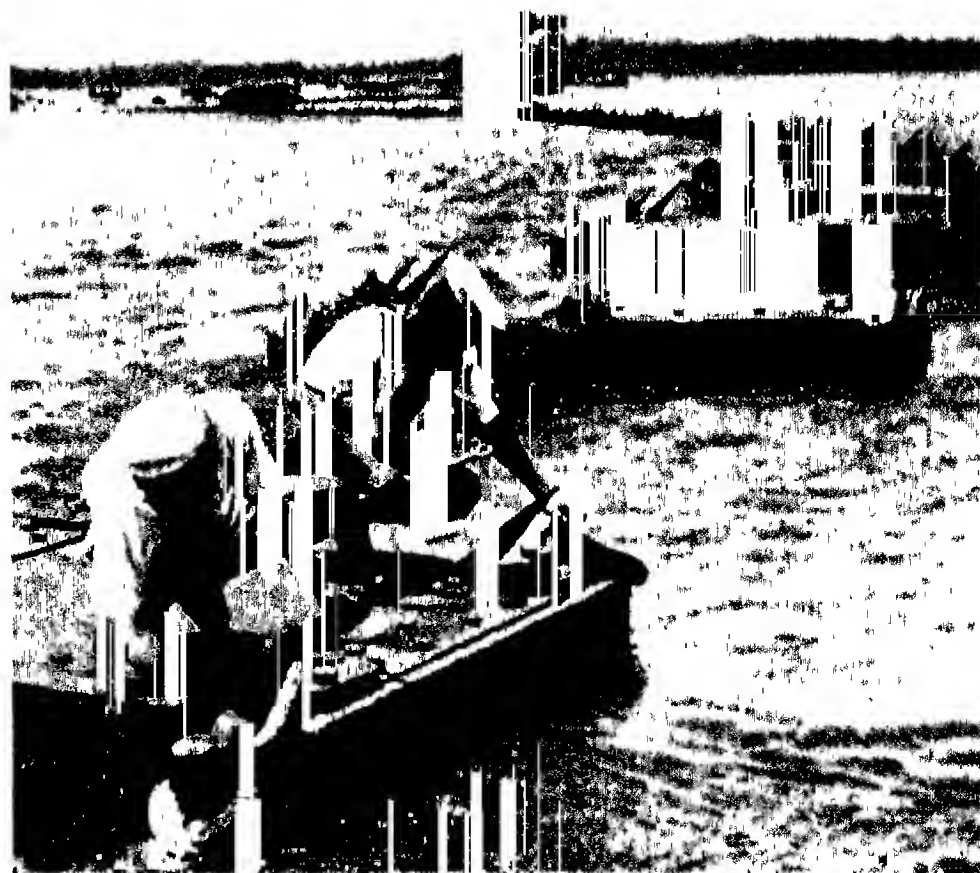
and the destroyer Ferret forced the boom at Portsmouth in 1909.

During the First Great War an improved type of boom was used for the protection of British harbours and naval bases. Timber balks 40 ft. thick were lashed close together and surmounted by rows of outward-curving steel spikes to prevent the boom from being jumped, while wide-meshed steel nets were suspended from the bottom of the boom to keep out submarines. One of the largest was that stretched across the entrance to Scapa Flow.

In the Second Great War booms were built with the express purpose of preventing the entrance of submarines or the firing of torpedoes from submarines on the seaward side of the nets. The booms consisted of miles of steel nets and heavy wire hawsers suspended below the surface at varying depths by means of large cylindrical steel buoys and kept in position by sinkers on the seabed. Sometimes the nets were dotted about with contact mines; others were electrified, and when a submarine made contact its position was recorded electrically on a chart in the control station on shore. The submarine was then destroyed by electrically firing the mines in its vicinity.

Specially built ships called boom defence vessels are used by the Royal Navy for maintaining boom defences.

Boom. Commercial term meaning a sudden and exceptional activity on the stock market. First used in a business sense in the U.S.A. about 1870, it soon became a recognized term in stock exchange circles.

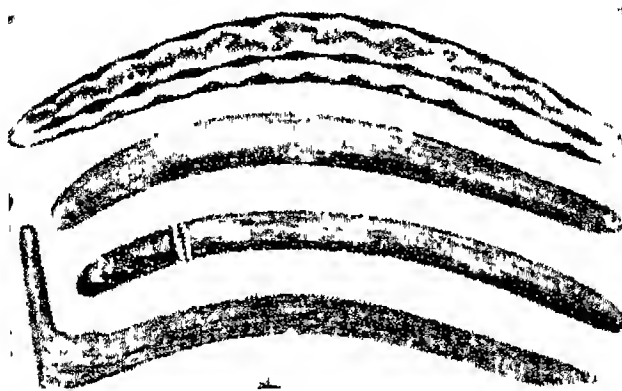


Boom. Malay seamen inspecting spiked floats of the boom defence outside Singapore harbour before 1942

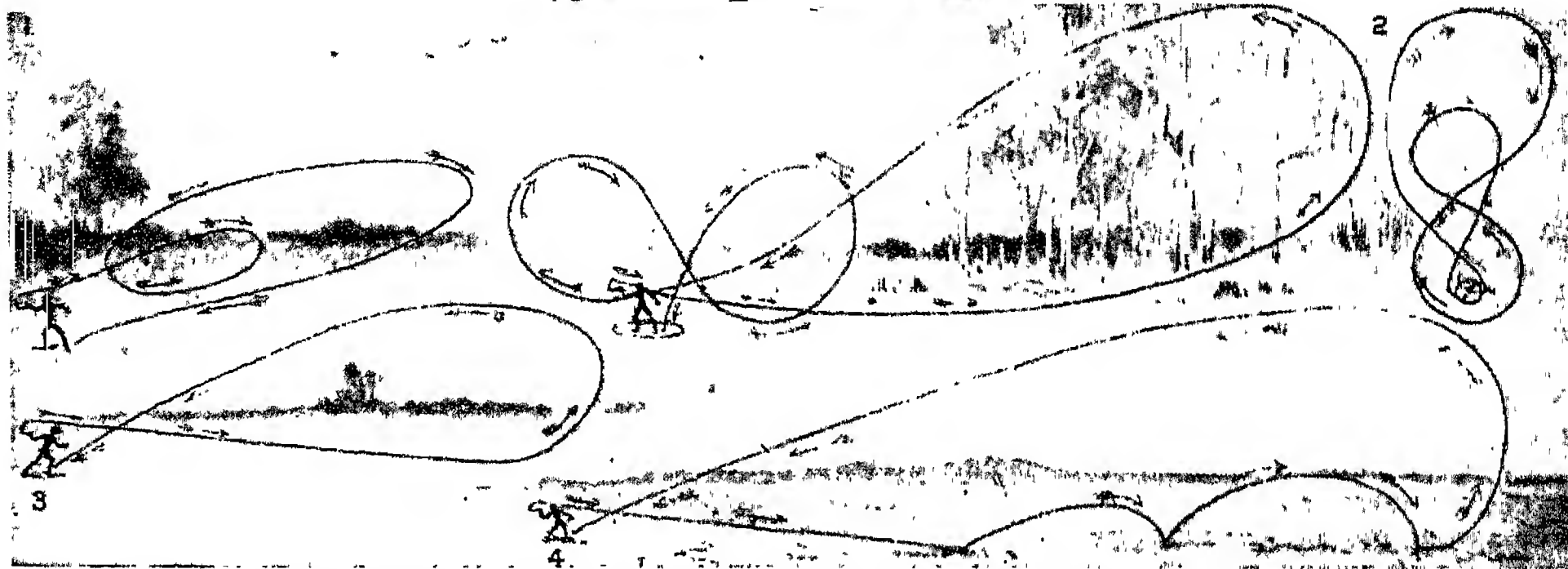
Boom. Town of Belgium, in the prov. of Antwerp, at the junction of the river Rupel and the Brussels canal, 11 m. by rly. S. of Antwerp. It has brick and tile works, tanneries, salt works, breweries, and shipbuilding yards. There is a fine bridge. Pop. (1947) 19,614.

Boomerang. Hunting and fighting missile of the Australian aborigines. It is made of hard wood bent to a curve over a fire, or shaped from a curved or forked bough or small tree trunk. It is from two to four feet long, rounded on one side and flat on the other and with a sharp edge. When

where he became a skilled hunter and trapper. His long life was mainly passed in fighting the Indians and making journeys into the wilds of Kentucky and Virginia. He had a number of remarkable adventures with Indians in the border wars, and his frontier



batteries to equalise the load. To supply the bus bars with current of normal pressure, the voltage of the battery must be somewhat higher than that at the terminals of the generators, to allow for drop during discharge. Assume the E.M.F. across the bus bars to be 220 volts; that of the battery 240-250 volts, according to state of charge; and that of the booster 30 volts. The booster, a small dynamo, driven by a motor receiving current from the bus bars, is placed in series with the battery across the bars on the + side, and, imposing its 30 volts on the normal 220 volts of the



Boomerang. 1, 2, and 3. Flights made by boomerangs thrown by native experts in New South Wales and Queensland. 4. Flight in which the boomerang strikes the ground 15-20 yards from the thrower's feet, ricochets twice, and returns. Above: non-returning boomerangs used in war. The lower three from N. Australia, the top example from Victoria

thrown, it rises slowly in the air, gyrating in a curved line until it reaches a height of several yards, when it begins to fly back again and sweeps over the head of the thrower to fall behind him. Sometimes the boomerang is thrown in such a way that during flight it will bound off the ground two or three times. The motion of the missile is due to the aerodynamic principle of air flow acting on a cambered surface (the bulging side of the boomerang). This return type is used only for sport. The war or hunting boomerang does not return; an expert can throw one to kill an animal 400 ft. away.

Boone. City of Iowa, U.S.A., the co. seat of Boone co. It is 43 m. N.N.W. of Des Moines, near the left bank of the Des Moines river. Among its chief buildings are the public library, the Biblical college, and the high school. An important trading centre for grain, coal, and cattle, it has railway and machine shops, brick, tile, and cement works, and tobacco factories. Pop. (1950) 12,164.

Boone, DANIEL (1735-1820). American pioneer. Born in Pennsylvania, he passed his boyhood in North Carolina, at Holman's Ford,

home, a fort in North Carolina, was more than once fiercely assailed, his daring becoming a legend. His later years were spent in Louisiana, where at one time he was an official of Spain. He died Sept. 26, 1820.

Boos, MARTIN (1762-1825). German pietist. He was born in Bavaria and became a Catholic priest, originating a religious movement in 1790 which was equivalent to that of the Protestant pietists of the Lutheran church. Although persecuted by his fellow Catholics, he continued to preach his propaganda throughout Austria from 1799 to 1812, and his views found favour with many priests. He was professor of theology at Düsseldorf 1817-19. He died Aug. 29, 1825.

Boost. In aeronautical engineering, the induction or manifold pressure, given in lb./sq. in.

Booster. Electrical apparatus for adding electromotive force to, or subtracting it from, a circuit in which E.M.F. already exists. Rotary boosters are used for direct current and static for alternating current. Rotary boosters are commonly installed in generating stations equipped with storage

main generator, enables the latter to charge the battery. The small machine thus obviates the need for a much larger and more expensive generator designed to generate a 250-volt current.

In many power stations which supply traction systems the demand for current varies so widely from moment to moment that batteries have to be relied upon to make up the difference between normal and peak loads. When the demand falls below normal, the generators, which have a constant output, pass on the surplus energy to the battery. An automatically reversible booster is used, which runs as a dynamo and assists the generators to charge the battery under light-load conditions, and also dispenses with the use of "end" or regulating cells, and acts as a motor when the battery is discharging to the bus bars. In the second case the booster's motor is driven and becomes a dynamo, returning current to the circuit; or the booster's field is reversed and its voltage imposed on the battery's.

Line-feeding boosters act in much the same way as irreversible battery boosters. Taking current from the bus bars, they add their

own voltage and transmit current at augmented pressure through separate feeders to distant points on the system, to make good the pressure-drop due to resistance in the main feeders. Negative boosters are employed to reduce pressure in the returns of tramways and railways and prevent it exceeding the 7 volts allowed by the Board of Trade. (See Battery; Dynamo.)

The term booster is also applied to a part of the bursting charge of an H.E. shell; it acts as a buffer to the main charge.

Boot. Instrument of torture used in Scotland and elsewhere. Usually it was made of four narrow pieces of wood or iron fastened together to form a fitting for the leg. The punishment consisted in hammering down wedges between the leg of the sufferer and the side of the boot; sometimes both legs were tortured, and there are cases on record in which the limbs were completely crushed. The boot was generally used to extort confession or information. It was employed in the 16th century, and was revived during the persecution of the Covenanters between 1660 and 1688. The last recorded case of its use was in 1690, and it was declared illegal by the British Parliament in 1709. See Torture.

Boötes (Gr., herdsman). Name of a constellation conspicuous in the sky from its containing the star Arcturus, the Watcher of the Bear. Arcturus stands midway between the legs of Boötes. *Pron.* Bo-ö-teez.

Booth. Word originally used in several Teutonic languages for a dwelling. It came soon to mean a temporary building, and in the latter sense is used today for covered stalls at fairs and markets, and for polling booths at elections.

Booth, BARTON (1681-1733). English actor. The son of a Lancashire squire, he was educated at Westminster School. In 1698 he appeared on the stage in Dublin, and in 1700 made his first appearance in London. There he was a great success and he became known as a tragedian. His triumphs included the Ghost in Hamlet, while his Cato made both reputation and fortune. He died May 10, 1733.

Booth, CHARLES (1840-1916). British merchant and sociologist. He was born March 30, 1840, and educated at Liverpool. A partner in the shipping firm of Alfred Booth & Co., he became widely known by his nine volumes on Life and Labour of the People in London, 1889-97. The method adopted was statistical, and the

books obtained for their author a high place among sociologists and the distinctions of privy councillor and F.R.S. During 1892-94 he was president of the Royal Statistical Society. He died Nov. 23, 1916.

Booth, EDWIN THOMAS (1833-93). An American actor. Born at Belair, Maryland, Nov. 13, 1833, the second son of the actor Junius Brutus Booth, he first appeared at the Boston Museum as Tressel to his father's Richard in Gibber's version of Richard III, Sept. 10, 1849. Later he won great success as a Shakespearian actor in California and Australia, and during 1863-67 was manager of the Winter Garden Theatre, New York, where he played Hamlet in 1864. In 1869 he built Booth's Theatre in New York and managed it until 1874, only just avoiding financial ruin in this venture. In 1880 and 1882 he played in London and Germany. He died at New York, June 7, 1893.

Booth, EVANGELINE (1865-1950). British-born American leader of the Salvation Army. The 7th child of William Booth, she was born Dec. 25, 1865. She started to work for the S.A. in 1881, becoming a commissioner in 1888. She commanded the S.A. in Canada, 1896-1904, in the U.S.A. 1904-34, becoming a U.S. citizen; and was general of the S.A. 1934-39. She died July 17, 1950. Orator, musician, poet, she wrote Love is All, 1927; Towards a Better World 1929.

Booth, HENRY (1788-1869). British railway pioneer. Son of a corn merchant, he was born at Liverpool, April 4, 1788. A friend of George Stephenson (*q.v.*), whom he helped to construct The Rocket, he was a promoter of the Liverpool and Manchester railway, 1830. He died at Liverpool, March 28, 1869.

Booth, JOHN WILKES (1839-65). An American assassin. A younger brother of Edwin Booth, the actor, he left the stage in 1863 and was bitterly hostile to the North in the Civil War. He instigated a plot for the murder of the president, Abraham Lincoln, whom he shot at Ford's Theatre, Washington, April 14, 1865 (Lincoln died next day). Escaping to Virginia, and refusing to surrender,



J. Wilkes Booth,
American assassin

he was shot in a barn 12 days later. Several of his fellow-conspirators were taken later, and four were hanged.

Booth, JUNIUS BRUTUS (1796-1852). British actor. He was born in London, May 1, 1796, the son of a lawyer, and made his debut on the stage at Peckham Dec. 13, 1813. Resembling Edmund Kean in features, stature, and voice, he was put forward as the great actor's rival at Covent Garden and at Drury Lane in Feb. and March of 1817, appearing as Richard III at the former house and playing Iago to Kean's Othello at the latter. He went to America in 1821, where he achieved considerable success. He died on a steamer going to Cincinnati, Nov. 30, 1852.

Booth, WILLIAM (1829-1912). Founder and first general of the Salvation Army. Born at Nottingham, April 10, 1829, he laboured as a minister of the Methodist New Connexion, 1855-61, and in 1865 began work as an unattached evangelist in East London. He established the East London Revival Society, which became known as the Christian Mission when it extended its operations outside the metropolis. He worked among the poorest and used the most unconventional methods, gradually adopting a quasi-military organization. This led to the adoption of the name of the Salvation Army in 1878, and the general superintendent was soon styled General. In course of time the Salvation Army spread all over the world, and the later years of General Booth's life were mainly occupied in visiting his missions.

To William Booth, a most able organizer, and a fervent and convincing preacher, and his wife Catherine Mumford (1829-90), in her work as remarkable as her husband, the S.A., with its periodicals and its various branches of business, owed its success. Booth's book In Darkest England (1890) proposed an ambitious scheme for the abolition of pauperism, but the response was unsatisfactory. In his last years he suffered from blindness, but continued to direct his organizations until his final illness and death, Aug. 20, 1912. See Salva-



William Booth,
Founder of the
Salvation Army
Elliot & Fry

tion Army; *consult also* Lives, F. St. G. De L. Booth-Tucker, 1898; G. S. Railton, 2nd ed. 1912; H. Begbie, 1920; God's Soldier, St. John Ervine, 1934.

Booth, WILLIAM BRAMWELL (1856-1929). British religious worker, 2nd general of the Salvation Army. Born at Halifax, March 8, 1856, in early manhood he assisted his father, William Booth, in the Christian Mission. In 1880 he became chief of the Salvation Army staff, and was general 1912-29. He died, June 16, 1929. In the same year appeared his journal, *These Fifty Years*.

Boothby, GUY NEWELL (1867-1905). Australian novelist. Born at Adelaide, South Australia, Oct. 13, 1867, he lived in England during 1874-83, then returned to South Australia, and travelled across the Australian continent from N. to S. 1891-92. In 1894 he published *On the Wallaby*, a record of his travels, and settled in England. He died at Bournemouth, Feb. 26, 1905. Of his 55 volumes of fiction, those in the Dr. Nikola series, beginning with *A Bid for Fortune*, 1895, were the most popular.

Boothe, CLARE (b. 1903). American author, politician, and diplomatist. Born April 10, 1903, for some years she was a well-known journalist and was at one time managing editor of *Vanity Fair* (New York). Her plays included *O Pyramids*, 1933; *Abide With Me*, 1935; *The Women*, 1936, a scathing satire on the wealthy women of American society; *Kiss the Boys Goodbye*, 1938; *Margin for Error*, 1939. Her travel book *European Spring*, 1940, was based upon her experiences in Europe as a foreign correspondent. In 1935 she married Henry Robinson Luce, founder and editor of the American periodicals *Time*, *Fortune*, and *Life*; she was Republican representative in congress for the 4th dist. of Connecticut, 1943-46. Mrs. Luce was United States ambassador to Italy during 1953-56.



Clare Boothe,
American writer
and diplomatist

Boothia. Gulf of the Arctic Ocean, N. America. About 315 m. long, and from 60 m. to 100 m.

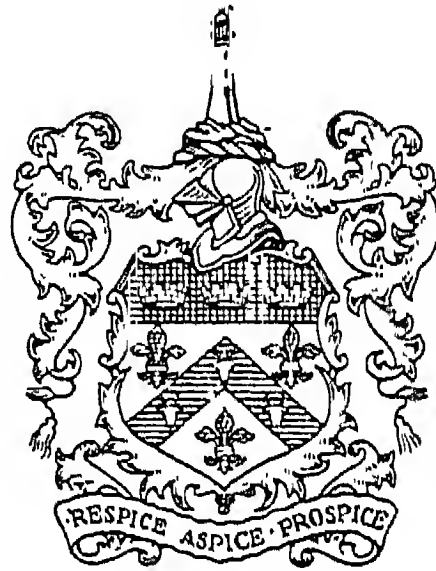
broad, it separates Boothia Peninsula from Cockburn Island and Melville Peninsula.

Boothia Peninsula. The most northerly part of the mainland of North America. Discovered by Sir John Ross in 1829, it was named by him after his patron, Sir Felix Booth. In 1831 Sir James Clark Ross, nephew of Sir John, located the north magnetic pole in its then position on the peninsula.

Bootle. A county borough and town of Lancashire, England. It stands at the mouth of the Mersey, adjoining Liverpool, and is served by two main railway lines. Its docks, covering an extensive area, are among the finest along the Mersey, and form part of the system belonging to the port of Liverpool and controlled by the Mersey docks and harbour board. The area suffered severely from German air raids in 1941. There are extensive warehouses for grain, cotton, and other raw materials; ship-repairing

and engineering works, timber-yards, jute factories, and flour mills. Bootle was incorporated in 1868, and became a co. bor. in 1889. It gives its name to a bor. constituency. The manor of Bootle, which figures in Domesday Book as Botelai, passed to the earls of Derby in the 18th century and belonged to them until 1928. Pop. (1951) 74,977.

Bootlegging. Name applied to dealings in illicit liquor. The pioneers of the U.S.A. found it expedient to outlaw the sale of alcoholic liquor to the Indians, who drank to excess and became dangerous. Unscrupulous citizens engaged in the forbidden traffic often concealed in the legs of their long boots the liquor they were carrying for sale. This gave the name bootlegger to the illicit dealer. The term was revived in the U.S.A. during 1920-33, when national prohibition brought about a revival in the illicit sale of alcoholic liquor.



Bootle arms

BOOTS AND SHOES & THEIR HISTORY

J. Korn, Principal, Cordwainers' Technical College, London

This article gives a history of footwear and its manufacture from primitive times to the days of mass production. See also Clog; Costume; Fashion; and entries on other articles of clothing

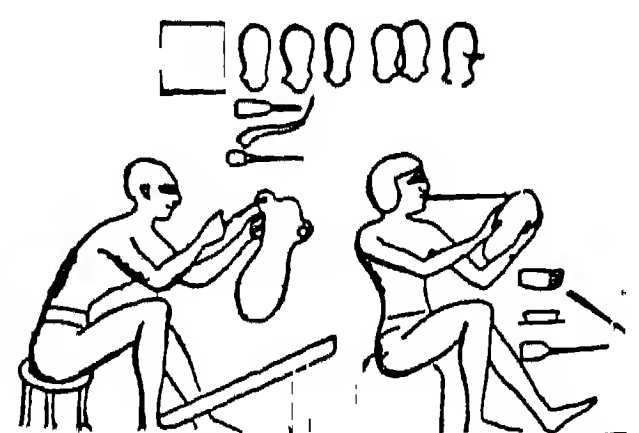
Boots and shoes are coverings for the human foot made of leather, fabric, rubber, or plastic material. The first shoes were probably the skins of animals that had been killed for food and were bound on the feet as protection against stones, rough ground, hot sand, and extreme cold. Animal skin has been the raw material of boots and shoes for thousands of years and remains of primary importance in their production.

Throughout recorded history there are references to foot coverings. The earliest authentic representations of boots and shoes are on the carvings of ancient Egypt, the earliest actual foot coverings are on the feet of Egyptian mummies. The Bible refers to Moses as removing his shoes when standing on holy ground.

The closed-in shoe worn by the Romans derived from a simple sandal consisting of a leather or wooden sole secured to the foot by leather thongs. Early closed-in shoes did not always have a rigid sole, the sole often being of the same soft leather as the upper

part. Roman shoes of the better sort were decorated with a variety of designs cut into the leather of the upper. Such cut-outs and slashings also gave greater flexibility to the shoe, and more freedom to the foot. Later, the soft upper was joined to a firm leather sole, flexible enough to allow the wearer to flex his foot when walking or running.

Shoes developed differently according to climate and local conditions. The North American Indians wore the mocassin: this had a soft sole brought up the sides of the foot, to which another

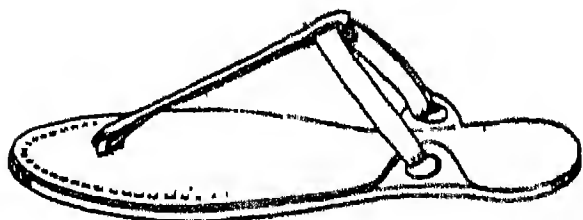


Boots and Shoes. Ancient Egyptian shoemakers, from an inscription

soft piece (the upper) was stitched—shoes of mocassin type became popular as slippers in most parts of the world.

At various periods throughout history, *e.g.* in ancient Greece, Rome, and Assyria, the boots or shoes worn have been an indication of the wearer's rank. Boots with high legs and complicated designs in metals and jewels were worn by the patricians of ancient Rome. The Emperor Caligula wore shoes heavily plated with iron, and such shoes were long called "caligulas." In medieval England and France court fashions in boots and shoes were often so fantastic as to create discomfort for their wearers: *e.g.* the toes were sometimes so extended that they had to be turned upwards and secured by chains to the knees. Wide-toed shoes, originally introduced as being more comfortable than narrow ones, eventually became so extreme that a sumptuary law was passed limiting the width of shoes.

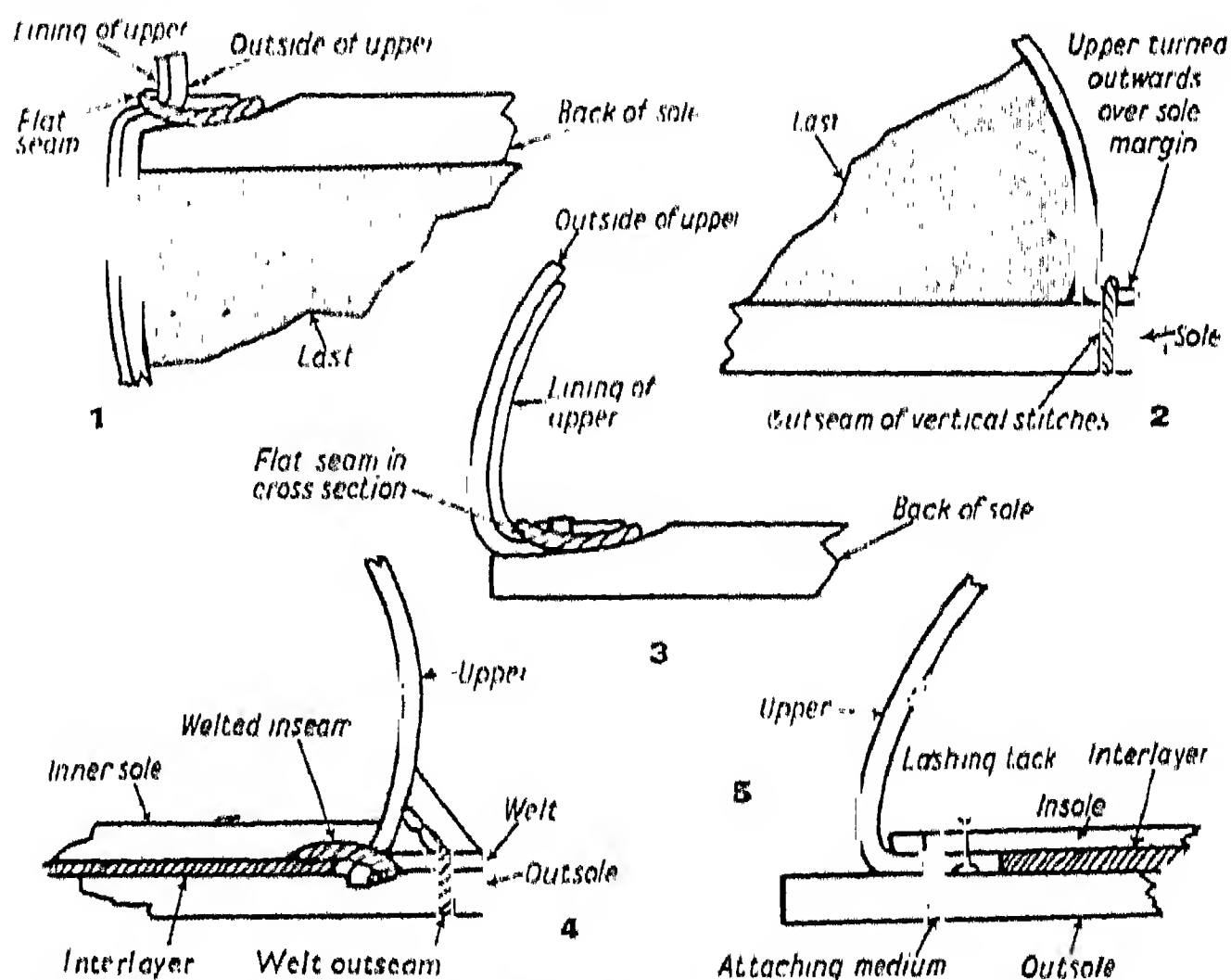
Boots and shoes originally had flat soles from heel to toe. The raised heel was introduced to add to the apparent height of the wearer, and to raise the foot from rough, dirty, and wet roads and paths. In China the foot was often raised clear from the ground by two blocks, one at the front and another at the back. This fashion was introduced into 16th-century Europe as the patten.



Boots. The earliest form of sandal: a sole held on the foot by leather thongs

Shoemakers had their trade organizations in early medieval times, and a London guild of shoemakers, the Worshipful Company of Cordwainers, was incorporated in 1410 and received a royal charter in 1439. The name "cordwainers" is derived from the goat leather called "cordovan" or "cordwain" produced in Córdoba, Spain, which was considered the finest leather for making shoe uppers. Similar guilds were formed in most of the large towns of Europe—notably in England, Germany, and France.

Until the middle of the 19th century, almost every village and town had its shoemaker who did the bulk of the work by hand according to methods passed down from father to son since medieval



Boots and shoes: Sectional diagrams. 1. Sew-round or turnshoe: sole, upper and sewing when seam is made. 2. Same, when shoe is turned. 3. Stitch-down method. 4. Seam of welted shoe. 5. Positions of upper, insole, outsole and seam for riveted, screwed, pegged, or Blake-sewn shoes

times; and the same methods continue in use for making shoes by hand. A piece of firm leather, previously "mellowed" by wetting so that it will mould easily, is fitted to the bottom of a last (a piece of wood of the shape of the wearer's foot). As the leather dries, it sets fairly firmly to the shape. When it is dry, surplus edges are trimmed off to give a clean and accurate edge. This shaped piece of leather, the "inner-sole," is the foundation on which the shoe is built.

The upper of the shoe is made in stages:

(1) The curves and measurements of the top of the last are reproduced in paper to form the basis for designing the upper. The reproduction is subdivided into the desired sections, to which margins for seams are added. This is "cutting the pattern."

(2) The paper sections are then copied in leather, a highly skilled process called "clicking" for which the cutter needs a comprehensive knowledge of all leathers and of the parts of an animal's skin best suited for use in each section of the shoe.

(3) The cut-out parts are then fitted together and "closed" by machinery to complete the making of the upper.

The closed upper is then placed over the last and strained to its shape; and the edges are tacked over and on to the inner sole—a process called "lasting." The

upper and the inner sole are joined with a horizontal hand-seam, and at the same time a strip of leather protruding outwardly, called the "welt," is added all round; the fastening tacks are removed as the seam is continued. Surplus upper is then trimmed off, and some material is placed on the bottom between the seams so as to level the bottom before the sole is attached. The sole, roughly shaped, is placed in position, held there with two or three tacks, and then sewn to the welt all round the shoe. The heel is next built on to the shoe in layers of leather. Sole and heel are then trimmed to the required shape, and when the shoe has been smoothed, stained, and polished, it is removed from the last. Where wooden heels are used, as for many women's shoes, they are shaped and covered with material to match the shoe before they are attached to the shoe.

Introduction of Machinery

Shoe-making machinery was introduced in the mid-19th century. The first machines were riveting machines used for attaching soles to uppers; a few years later sewing machines were invented for stitching uppers and for sewing on the soles. Machine-made boots and shoes may go through as many as 300 operations, each done by a different machine; they may be welted, machine-sewn, "stuck-on," or "welded."

Machinery transformed shoe-making from a trade carried on



1. Preparing the undersole of a hand-made shoe. 2. Stretching the upper of a hand-made shoe. 3. Machine that stitches together insole, welt, and upper. 4. Machine-stitching the sole to the upper. 5. Machine for stretching

Courtesy The Cordwainers Technical College
the upper over the last. 6. Shaping the upper on the lasting machine. 7. Machine for folding-in and pleating the upper around the bottom of insole. 8. Machine that forms Louis heels and attaches them to shoes

BOOTS AND SHOES: HAND AND MACHINE PROCESSES OF MANUFACTURE

by workers in their homes into a mass-production factory industry, with factories turning out thousands of pairs of boots and shoes weekly. The main centres of boot and shoe production in the U.K. are Bristol, London, Leicester, Northampton, and Norwich. Boots and shoes for men are usually welted, for women and children are generally "welted" or machine-sewn. Many children's shoes are made with the edge of the upper turned outwards from the last and stitched direct on to the sole. In all classes of shoe production, rubber and rubber composition, plastics, and other synthetic materials have to some extent replaced leather.

Training in Shoemaking

The British shoe industry has developed an extensive system of training—there are schools of shoemaking in all the main centres of shoe manufacture. Most of the students who attend these schools work for the City and Guilds of London Institute examinations in boot and shoe manufacture. The British Boot and Shoe Institute, a professional body, awards scholarships, associateships, and fellowships, and publishes a journal.

The Shoe & Allied Trades Research Association (Satra), to which most British manufacturers belong, deals with problems of materials and processes, publishing regular reports for the trade as well as reports on specific problems for individual manufacturers. There is a workers' and an employers' trade organization in the industry, which has a long tradition of peaceful negotiation; and a board of arbitration that has been a pattern for other industries. Shoes are supplied to retailers either direct from the manufacturer or through one of the many wholesale factors. Some of the larger producers have their own shops; and some multiple retailers offer shoes made in their own factories as well as lines made by other manufacturers.

Booty (Ger. *Beute*; Fr. *butin*). In war, everything captured on the battlefield that does not come under the head of "personal belongings." Booty becomes the property of the belligerent government, not of its troops. It includes vehicles, arms, ammunition, and military papers, even if they be the property of individuals, but not cash, jewelry, or other private articles of value.

Boppard. Town and holiday resort of Germany in Rhineland-

Palatinate, on the left bank of the Rhine, 10 m. S. of Coblenz. Formerly a free city, it contains two old churches, and a castle, once the residence of the electors of Trèves. Many traces of its medieval walls and fortifications remain. First a Celtic and then a Roman settlement, it was important in medieval times on account of its position. For centuries it was in the domain of the electors of Trèves. It became Prussian in 1815. Trade in fruit and wine is carried on. On March 18, 1945, troops of the U.S. 3rd army captured Boppard from the Germans.

Bora (Lat. *Boreas*, north wind). Bitterly cold north wind experienced at the head of the Adriatic. It is due to the air over the highlands of Istria and Dalmatia becoming intensely cold, and then being hastily withdrawn to lower levels by marked cyclonic conditions over the Adriatic.

Bora, KATHARINA VON (1499-1552). The wife of Martin Luther. Born near Bitterfeld, Saxony, Jan. 20, 1499, she entered a Cistercian convent in Saxony about 1510. There she learned something of Luther's teachings and made the acquaintance of the reformer himself, her flight from the convent to Wittenberg in April, 1523, being the result. Luther placed her in the care of the burgomaster there, and on June 13, 1525, married her. She bore him three sons and three daughters, and, outliving her husband, died in poverty at Torgau, Dec. 20, 1552. See Luther, Martin.

Bora-Bora OR BOLABOLA. One of the French Leeward Islands, in the E. Pacific. Lying N.W. of Tahiti, it is 30 m. in circuit, is well-wooded, has a volcanic peak, and is surrounded by coral islets.

Boracic Acid OR BORIC ACID. Acid of borax. It was first prepared by W. Homberg in 1702 and termed *sal sedativum* (sedative salt). Baron, however, in 1747 showed the true nature of Homberg's salt, and, in accordance with the Lavoisierian system, it received the name boracic acid, H_3BO_3 . Now known in systematic nomenclature as boric acid, it occurs native in the lagoons of Monte Rotondo, Tuscany, where, in 1815, a factory was built for preparing it.



Boppard. Town and holiday resort of Germany, delightfully situated in a sheltered position on the Rhine

It was not until 1828, when a system of utilising natural steam jets was devised, that the undertaking succeeded.

The volcanic steam jets known as *saffioni* contain traces of boric acid, and are led into the lagoons, which are evaporated by the heat and yield crystals of the acid. The concentration of the lagoon water is brought about gradually in a succession of six or eight brick basins communicating with each other. The liquid from the last basin deposits boric acid. The crystals thus obtained are finally purified by mixing with animal charcoal, redissolving in water, filtering the liquid, and evaporating again. Boric acid is also prepared from natural borax in California. The process consists in dissolving the native borax in hot hydrochloric acid, when boric acid separates, this being afterwards recrystallised from hot water.

Boric acid is smooth to the touch and changes the colour of blue litmus tincture to a wine-red. The acid communicates a characteristic green colour to a non-luminous flame. A well-known test for boric acid is the brown colour it gives to turmeric test-paper, which remains unaltered in the presence of hydrochloric acid. Boric acid has been used in medicine as a mild antiseptic; as a preservative of perishable articles; and in many industries such as metal enamelling, porcelain glazing, optical glass making, making Guignet's green, and preserving skins for the tanner. It forms salts known as borates with alkalis and metals.

Borage. Annual or perennial plant of the genus *Borago*, family Boraginaceae, native to central and south Europe. Of the species grown in gardens in Great Britain, *B. officinalis* is an annual, with hairy stems, aromatic leaves, and clusters of brilliant blue flowers in

June and July. It grows to 2 ft. in height and is naturalised in Great Britain. Short fresh sprigs of it have long been used for adding a distinctive flavour to claret cup and other drinks. Propagation is by seed sown in March where the plants are to remain and flower. A perennial species is *B. laxiflora*, 12 ins. high, with pale blue flowers from May to Sept.; propagation is by root division in April.

Boraginaceae. Family of dicotyledonous herbs and, rarely, shrubs. They are bristly or hairy, with tapering stem and alternate leaves. The tubular, bell- or salver-shaped flowers are borne in coiled sprays, and the fruit always consists of four single-seeded nutlets. The family includes 100 genera with about 1,800 species, natives of tropical, temperate, and especially Mediterranean regions. The roots of some yield purple and brown dyes.

Borah, WILLIAM EDGAR (1865–1940). American politician, a prominent "isolationist." Born at Fairfield, Ill., June 29, 1865, he was Republican senator for Idaho from 1907 until his death. Chief of the isolationists, he led opposition to ratification of the treaty of Versailles, thus helping to keep the U.S.A. out of the League of Nations. He was chairman of the senate foreign relations committee 1924–33. Bitterly opposed to the New Deal, he also in 1939 vociferously supported those who stopped revision of the 1937 Neutrality Act. He died Jan. 19, 1940.

Borama. Township of British Somaliland, East Africa. It is some 5 m. from the Ethiopian frontier and 70 m. W.N.W. of Hargeisa, with which it is connected by trunk road. Lying at an alt. of 5,000 ft. among scrub and acacia-covered hills, it is the centre of an area in which agriculture, primarily millet production, is of importance. Borama is an administrative centre and has a govt. hospital; at Amud near by is a secondary school, opened in 1953. Pop. (est.) 4,000.

Borås. Town of Sweden, in the county of Älvsborg. On the Viska river, 44 m. by rly. E. of Gothenburg, it was founded by Gustavus Adolphus in 1622. Sweden's textile area lies between Gothenburg and Borås, which is the country's chief cotton town, with spinning and weaving mills, and also produces rayon, hosiery, and ready-made clothing. There are a textile institute and several specialist textile training schools. Pop. (1953) 60,841.

Borax. The commonest salt of boric acid, sodium pyroborate (or diborate), $\text{Na}_2\text{B}_4\text{O}_7$, usually combined with 5 or 10 molecules of water of crystallisation. It has long been used as a flux in metallurgy, and for softening water. The name comes from the Arabic *buraq*, and it was called *baurach* by Geber. Naturally-occurring borax was originally obtained from Tibet, under the name of tincal; it was prepared in Europe by treating boric acid with soda, or by treating the naturally-occurring calcium or magnesium borates with sodium carbonate. Today the borax of commerce is usually prepared from the natural borax of Lake Borax in southern California, U.S.A., where the water contains about one ounce of borax per gallon. Other sources are the minerals borocalcite, $\text{CaB}_4\text{O}_7 \cdot 4\text{H}_2\text{O}$, and boracite, $2\text{Mg}_3\text{B}_8\text{O}_{15} \cdot \text{MgCl}_2$.

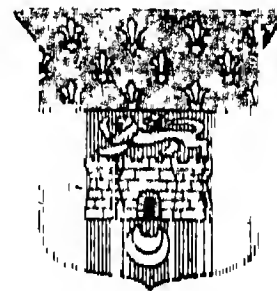
Borax is used extensively as a very mild alkali and water-softening agent, and it gives a high gloss to linen on ironing. By electrolysis or by treating boric acid with sodium peroxide, perborates, used as antiseptics and bleaching agents, are formed. Fused borax dissolves many metal oxides to give characteristically coloured glasses used as glazes and enamels. The addition of borax to ordinary soda-glass produces a hard glass (borax glass) which has a much lower coefficient of thermal expansion than ordinary glass and is widely used for heat-resisting glassware. Because of its reaction with metal oxides, borax is an excellent flux for brazing or silver soldering, and borax beads are used in chemical analysis as a test for the presence of certain metals: fused in a wire loop in manganese compounds, for instance, the bead

turns violet; in cobalt compounds it turns a deep blue.

Bord and Pillar. Method of coalmining by which pillars of coal are formed and afterwards robbed (removed). In beginning the work, a series of openings, or bords, as wide as the strength of the roof will allow, is driven at right angles to the cleavage planes of the coal. At the same time another series of smaller openings, called walls, is driven at right angles to the bords, and thus rectangular pillars of coal are formed. These pillars are removed by taking slices from them, the roof being supported by packs or timbering. The three operations, driving bords and walls and robbing pillars, take place simultaneously within a short distance of each other.

Bord and pillar working is practicable only in seams 5 ft. or over. In America pillars are frequently left standing since the cost of substituting alternative roof supports may exceed the value of the coal in the pillar.

Bordeaux. City and port of France, capital of Gironde dept. It stands on the left bank of the Garonne, about 46 m. from the sea, and 360 m. by rly. S. by W. of Paris. A suburb, La Bastide, on the right bank of the river, is connected by



Bordeaux arms

bridges. It is well served by railways and electric trams and is connected with the Mediterranean Sea by the Canal du Midi.

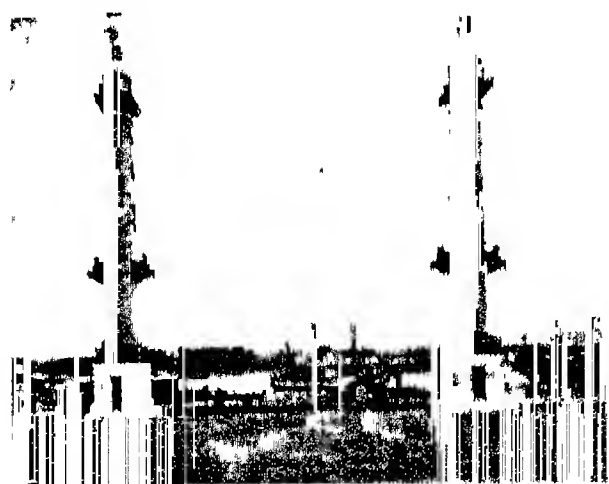
Bordeaux, which is both a sea and a river port, has a fine harbour formed by a curve of the Garonne; ample modern docks line its banks. Vessels drawing up to 36 ft. can reach it at certain states of the tide. The centre of the wine trade, the district around being noted for its vineyards, it has also a trade in fish, timber, and coal, and manufactures flour, beer, and tobacco. Shipbuilding is an important industry.

The chief buildings are the cathedral of S. André, a magnificent Gothic structure of the 12th–14th centuries, the church of S. Sevrin, 11th–15th centuries, the 15th-century collegiate church of S. Michel with its celebrated spire, and Sainte Croix, 12th–13th centuries. There are remains of a Roman amphitheatre and four magnificent old gateways. The Grand Theatre, built 1780, is notable as the meeting place of the National Assembly in 1871. The city has a



Bordeaux. Cathedral of S. André, a late medieval Gothic building

fine public library, containing upwards of 340,000 volumes and a large number of valuable MSS., several museums with collections of paintings and antiquities, a public garden laid out in the 18th century, and a university. Of the squares, the Place des Quinconces contains two towers used as lighthouses, a monument to the Giron-



Bordeaux. Rostral columns, 65 ft. high, which serve as lighthouses

dins, and a statue of Montaigne, the city's most distinguished native. Pop. (1954) 257,946.

As Burdigala Bordeaux was a Roman city, after which it was the capital of the duchy of Guienne. For 300 years before 1453 it belonged to England. Many of its finest buildings were erected and its streets and squares laid out by the marquis de Tourny, governor during 1743-57. It was to Bordeaux that the French government migrated when Paris was threatened by the Germans in 1870, and again in 1914. The French govt. was also at Bordeaux for a fortnight in June, 1940, until, under the Franco-German armistice, Bordeaux came within the German zone of occupation. The Germans made it a submarine base, and a base for long-range aircraft flying out over the Atlantic. Several heavy Allied air raids were made during Jan.-Aug., 1944, oil storage depots and the U-boat pens being the targets. After the Allied landing in S. France on Aug. 15, the German garrison withdrew to the mouth of the Gironde (*q.v.*) before the insurgent F.F.I., who were in control of Bordeaux by Aug. 31.

Bordeaux. Name of wines grown in the Gironde, France, and exported from Bordeaux. The wine-growing district borders the lower Garonne and the Dordogne. Bordeaux wines are either white or red. The chief are those of Médoc (claret), Sauternes, Graves, and St. Emilion. Bordeaux was noted for the export of wines from the 4th century, and the word is applied as port is named from Oporto, its port of export.

Bordeaux, HENRI (b. 1870). French author, born at Thonon-les-Bains, Jan. 29, 1870. Before becoming an officer of the French artillery he wrote a number of novels. In the First Great War he took part in the defence of Verdun, of which he constituted himself the historian, publishing in 1917 *Les Captifs Délivrés* (Douaumont Vaux). In 1919 he returned to novel writing with *Une Honnête Femme*, and was elected to the French Academy.

Bordeaux Mixture. Valuable fungicide (*q.v.*) prepared by adding milk of lime to a solution of copper sulphate (bluestone). It is used for spraying various plants as either a preventive or a remedial measure, especially in potato disease. The active substance is copper hydrate, and excess of lime should be added to remove all acid properties. It was first prepared in 1884 near Bordeaux by a chemist Henri Millardet.

Bordelais. Name given before the Revolution to that part of France of which Bordeaux was the capital. It was in the prov. of Guienne. The district is now celebrated for its wines.

Borden or Port BORDEN. Seaport on the S. coast of Prince Edward Island, Canada. It is 13 m. S.W. of Emerald Junction, and is a branch terminus on the Prince Edward Island rly.

Borden, SIR FREDERICK WILLIAM (1847-1917). Canadian statesman. Born in Nova Scotia, May 14, 1847, he graduated in medicine at Harvard, and began to practise in 1868. In 1874 he entered the dominion parliament, and from 1896 to 1911 was minister of Militia and Defence in Laurier's cabinet. In that capacity he was responsible for the Canadian Regiment in the South African War. He attended the Imperial Defence Conference in London, 1909. Created K.C.M.G. in 1902, he retired from political life in 1911, and died Jan. 6, 1917.

Borden, MARY. Anglo-American author. Born in Chicago, she made a considerable reputation as a novelist and writer of short

stories. Her books were widely read in the U.S.A. and Great Britain; the best known included *Jane—Our Stranger*, 1924; *Flamingo*, 1927; *A*



Mary Borden, Anglo-American author

Woman with White Eyes, 1930; *Sarah Gay*, 1931; *The Black Virgin*, 1937; *Passport for a Girl*, 1939. She married Maj.-Gen. Sir Edward Spears in 1918.

Borden, SIR ROBERT LAIRD (1854-1937). Canadian statesman. Born at Grand Pré, Nova Scotia, June 26, 1854, he was educated at Horton, and became a barrister in 1878, entering the Canadian house of commons as Conservative member for Halifax, 1896.



Sir Robert Borden, Canadian statesman
Lafayette

In 1901 Borden was chosen as leader of his party in the Commons. Although he had never held ministerial office before, he became premier 1911-20, the general election of 1911 having given a majority to the Conservatives, who had been out of power since 1896.

He was admitted to the privy council in 1912, and made G.C.M.G. in 1914. Sir Robert was the first minister from the overseas Dominions who attended a meeting of the cabinet in London (July, 1915). He represented Canada in the Imperial War Cabinet and Conference, 1917-18, and attended the meetings of the Peace Conference in Paris, Jan.-April, 1919. He resigned the premiership July 1920. In 1930 he was chairman of the 6th committee of assembly of the League of Nations. At Oxford, 1927, he gave the first Rhodes memorial lecture. He died June 10, 1937.

Border Regiment. Regiment of the British army formed in 1881 by the amalgamation of the 34th and 55th Foot. The 34th Foot



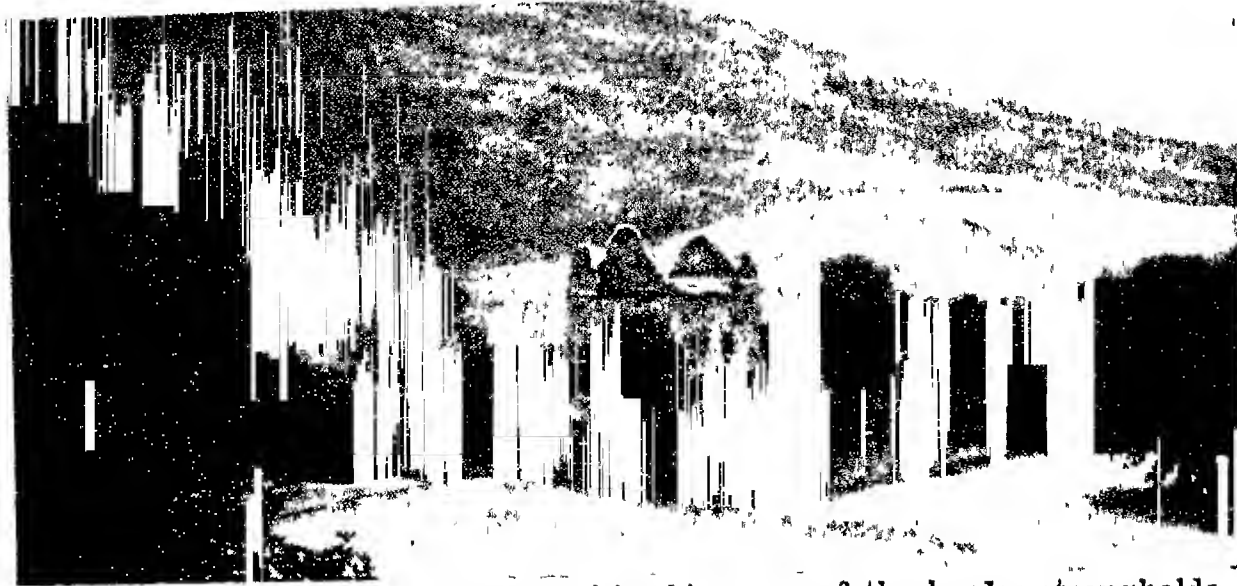
Border Regiment badge

was raised in 1702, and first saw service under the earl of Peterborough in Spain. It was engaged at the siege of Barcelona, and formed the garrison of Tortosa. Under Marlborough it assisted at the siege of Douai; it was at the attack on Vigo, 1719, the defence of Gibraltar, 1727, and the battle at Culloden, 1746.

The 55th Foot was raised at Stirling in 1755, and was sent to America, where it distinguished itself at Fort Ticonderoga, 1758.

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The New Universal Encyclopedia



The Borders. Newark Tower, Dumfriesshire, one of the border strongholds

It served in the Indian Mutiny and the Crimea, and in the South African War.

The Border Regiment was represented by its many service battalions in most campaigns of the First Great War, and regular and territorial battalions went to France with the B.E.F. in 1939. A battalion shared with Australian troops the capture of Jezzin, June 15, 1941, in the Syrian campaign. Other battalions served in Burma and North Africa; and a glider-borne battalion fought at Arnhem. The regimental depot is at Carlisle.

Borders, THE. Any land on the borders of two countries, but a term specially applied to the district where the borders of England and Scotland meet, and occasionally to the borders between England and Wales.

The future Anglo-Scottish frontier was first shaped by Hadrian's Wall, Roman occupation north of that line having little duration or effect. For many years after the formation of English kingdoms in the 5th and 6th centuries, the border districts, represented by Northumbria, Strathclyde, and Lothian, frequently changed hands. William II, by adding Cumberland to England, established the border almost as it is today; but it was long before this line was respected.

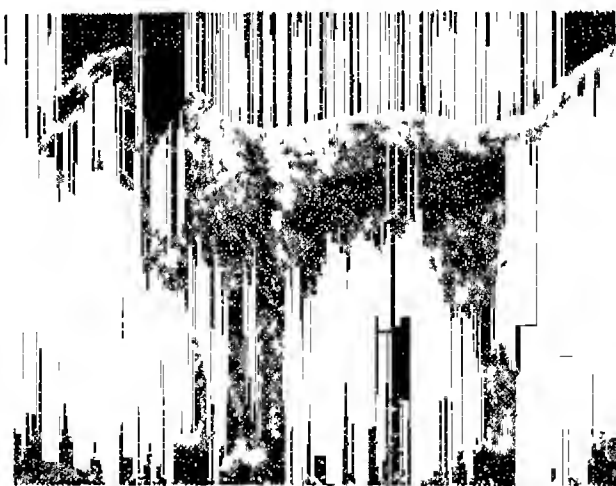
The disputed Scottish succession in the time of Edward I of England introduced a long period of border warfare and distress. Edward appointed a first "keeper" of the marches in 1297; this was Robert de Clifford, killed leading a charge at Bannockburn in 1314. Later the office of keeper was sometimes divided into wardenships of the eastern, middle, and western marches. The Scots also had their wardens, and for three centuries the borders were the scene of warfare declared or undeclared.

After the peace of 1550 between England and Scotland, attempts were made to restore order in this

lawless district, but the habits of plunder were strong and were not eradicated until James VI of Scotland became James I of England in 1603.

The medieval border districts consisted of Northumberland and Cumberland on the English side, and on the Scottish, Berwickshire, Roxburghshire, and Dumfriesshire, and to a lesser extent Selkirk and Peebles. The great English families were the Percys, Nevilles, Greys, and Dacres; the Scottish were the Douglasses, Hepburns, Armstrongs, and Eliots. The Borders have a wild literature of their own; their ballads are preserved in Sir Walter Scott's *Minstrelsy of the Scottish Border*; many stories are told in J. M. Wilson's *Tales of the Borders*.

Border Terrier. An unspoilt and attractive working terrier



Border Terrier. A champion specimen

which in its native county of Northumberland is widely used in all forms of sport. A game little dog, it is ready to take on anything, fox, rabbit, or any vermin, and the longest day on the fells does not tire it. The Border terrier weighs 12-15 lb., and has a moderately broad head and strong muzzle, a short, harsh, dense, weather-resistant coat, in colour red, wheaten, grizzle-and-tan, or blue-and-tan.

Bordet, JULES (b. 1870). Belgian physiologist. He was born at Soignies, June 13, 1870, and educated at Brussels, becoming M.D. in 1892. During 1894-1901 he worked at the Pasteur institute,

Paris. Returning to Brussels, he founded there a Pasteur institute, of which he was director 1901-40, and was appointed a professor in the university, a post he held until 1935. In 1919 Bordet received the Nobel prize for medicine. His researches in bacteriology led to the discovery of methods of diagnosing infectious fevers and the microbe of whooping-cough.

Bordighera. Town of Italy, in the province of Imperia. A popular winter resort of the Riviera, it is 6 m. W. of San Remo and 90 m. S.W. of Genoa. Pop. (1951) 9,009.

Bordone, PARIS (1500-71). Italian painter of the Venetian school, noted as a colourist. Born at Treviso in July, 1500, he was left an orphan at seven, and was sent to Titian's studio in Venice. Although for a time his work was influenced by Giorgione, he eventually modelled his style on Titian's. As a portrait painter he had few equals; but his most important work consisted of the six sacred subjects with which he decorated the dome of San Vincenzo, Treviso. *Le consegna dell'anello al doge* (presentation of the ring to the doge), painted for the school of S. Mark, 1535, and now in the Accademia, Venice, is famous. In 1538, Bordone visited France, where he painted Francis I and several of the French courtiers; he was knighted by Francis II. He died in Venice, Jan. 19, 1571. There are two of his paintings in the National Gallery, London.

Bordure or **BORDER.** In heraldry, a border or band round the edge of a shield or banner. It should occupy one-fifth of the field, and is considered a sub-ordinary.

Bore. The cylindrical passage through the barrel of a firearm from the breech to the muzzle. It is now invariably circular in section, though in the early days of firearms it was frequently elliptical and sometimes hexagonal.

The size of a shot-gun is defined as being of such a number bore, the number referring to the size of the bullets for which the rifle was bored and the size being defined by the number of bullets to the pound of lead. Thus, a 16-bore gun used bullets each of which weighed 1 oz. The four principal sporting guns with their corresponding calibre in inches are: 12-bore, .729 in. diameter; 16-bore, .662 in.; 20-bore, .615 in.; 24-bore, .579 in. diameter.

In a rifled firearm the internal surface of the bore is grooved from the breech to the muzzle.

Bore (Icelandic *bara*, billow). Crest-fronted wave which rushes up certain rivers at the time of high or spring tides. In funnel-shaped estuaries the advancing tidal wave is concentrated on a steadily narrowing front, and as the river cannot accommodate itself to the increased volume, a wave is produced, which rushes up-stream like a wall of foaming water several feet in height, often with disastrous results to shipping. Bores are well developed on the Amazon, Yang-tse-kiang, Seine, Severn, Trent, and Bay of Fundy.

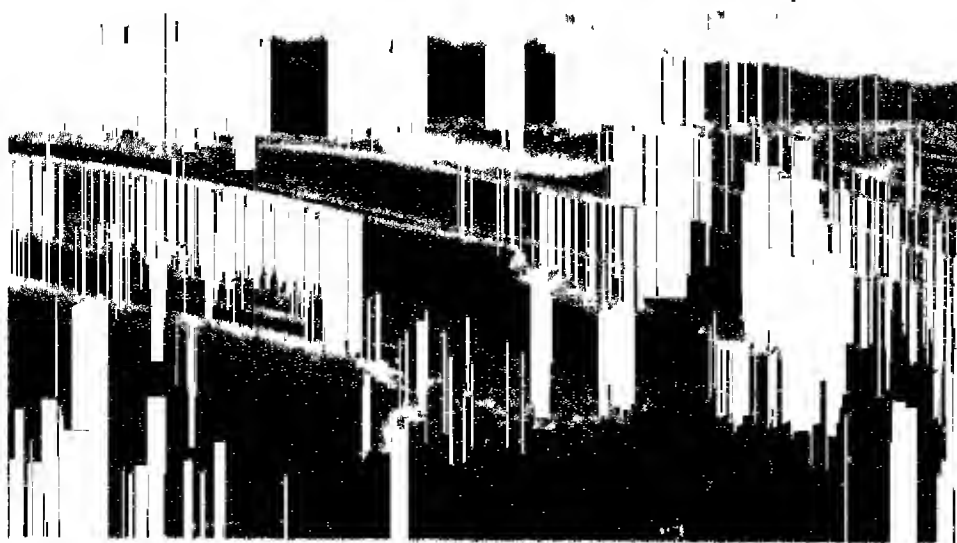
Bore. Term applied to a person or thing that taxes the patience or induces fatigue by dullness, repetition, irrelevance, or unseasonableness. This special use of the word dates from the 18th century—when it also meant boredom, and was often spelt "boar"—and was perhaps invented by the Macaronis (*q.v.*) for those who scoffed at their affectations. This sense is generally regarded as a figurative application of the literal meaning of the verb (to bore, pierce), although the Macaronis may have adapted it from the French *bourrer*, to stuff, also to abuse or taunt.

Boreas. In Greek mythology, the personification of the north wind. He dwelt in a cave on Mt. Haemus in Thrace.

Borecole. Plants which are members of the cabbage family Cruciferae, genus *Brassica*. They develop leaf only, without making heart. Kale and curly kale are the best known varieties. Borecole yields a supply of greenstuff in winter, when vegetables of this class are scarce. Seed should be sown in April, and the seedlings transplanted about six weeks later to 6 in. apart. After a similar interval they should be planted out with the plants from 12 in. to 18 in. apart every way.

Borelli, GIOVANNI ALFONSO (1608–79). Italian mathematician and physiologist. Born near Naples, Jan. 28, 1608, he became professor of mathematics at Messina and at Pisa, and from 1674 resided at Rome, where he died Dec. 31, 1679. In his *De Motu Animalium*, published 1680–1 (Eng. trans. *The Flight of Birds*, T. O'B. Hubbard and J. H. Ledeboer, 1911), by applying mathematics

to the movements of animals, he became the founder of the introductory physical school, which explained



Bore. How the bore advances up the river Trent near Gainsborough from the waters of the Humber

the actions and functions of the body by the laws of physics, and applied physical or mechanical principles to the treatment of disease. His treatise on the comet of 1664 was one of the earliest suggestions of the parabolic path of comets, and in another astronomical treatise he suggested that the satellites of Jupiter were governed by the laws of attraction.

Borga or **Porvoo.** City and seaport of Finland, in the prov. of Nyland. It stands at the mouth of



the Borga river, 39 m. by rly. N.E. of Helsinki. The seat of a Lutheran bishopric, it has a Gothic cathedral, founded 1414, and a museum. It trades in timber, sailcloth, wool, furs, and tobacco. The constitution of Finland, granted by Alexander I, tsar of Russia, was framed here, March 27, 1809. Pop. (1953) 8,803.

Borgerhout. Town of Belgium, 2 m. E. of Antwerp, of which it is virtually a suburb. It is an industrial centre with linen mills and candle factories; diamond-cutting and tobacco blending are other industries. The pop. at the 1947 census was 50,877.

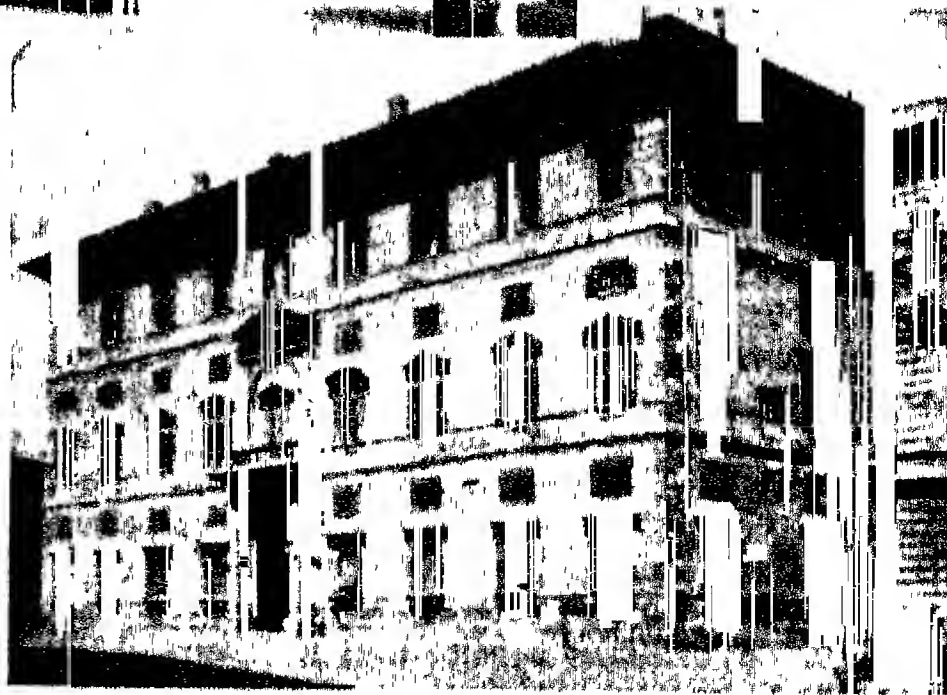
Borghat. Pass of India. It crosses the Western Ghats, in Poona district, Bombay, and rises to 1,831 ft. above its base.

Borghese. Name of an Italian family founded at Siena in the 13th century. They received the principality of Viterbo from Pope Paul V (Camillo Borghese), and the title of princes of Sulmona in 1610, and of Rossano, by marriage into the Aldobrandini family, in 1614.

Camillo Filippo Ludovico Borghese (1775–1832), after joining the French army, married Napoleon I's sister, Pauline Bonaparte, in 1803, and was appointed governor-general of Piedmont. The territories conveyed to him by Napoleon in part payment for the Borghese art treasures, valued at 13,000,000 francs (£600,000), were reclaimed by the king of Sardinia in 1815, and Borghese recovered a certain part of his collection. The collection was diminished by

sales in 1802–93, but the Borghese Palace in Rome still contains a number of famous paintings and works of art. The title of prince is retained in the family. Giovanni Borghese (1855–1918) was a distinguished social reformer.

Borghese Palace. Mansion of the Borghese family in Rome. A



Borghese Palace, Rome. The splendid mansion of one of papal Rome's wealthiest and most powerful families. Above, one of the rooms filled with works of art

magnificent building between the Corso and the Ripetta bridge on the Tiber, it was begun in 1590 from designs by Martino Longhi the Elder, and finished, 1607, by Flaminio Ponzio. The main court has a two-storeyed colonnade, with clustered granite columns, and behind it is a small garden.

Borghese Villa. Formerly the summer residence of the Borghese family, now the Villa Umberto Primo, in Rome. Founded in the early 17th century by Cardinal Scipio Borghese, from designs by Vasanzio, the beautiful grounds, situated just outside the N. walls of the city, contain ornamental buildings, imitation ruins, antique statues, etc., the Casino housing one of the best private art collections in Rome. The Villa, with picture gallery, park, and buildings, was bought by the Italian government in 1901. Besides statuary, ancient and modern, there are many pictures of the N. Italian school, including works by Botticelli, Raphael, and Correggio.

Borgia. Italian form of the name of a noble Spanish family, de Borja, which rose to power in Italy in the 15th century. Alonso de Borja was made bishop of Valencia and accompanied King Alphonso of Aragon to Naples. Made a cardinal in 1444, he was elected pope, taking the name Calixtus III. Many of his relatives then flocked to Rome. The sister of Calixtus III was the mother of Rodrigo, who took the name of Borgia and later became pope as Alexander VI. The family included also many cardinals, and one saint, Francesco Borgia.

Borgia, CESARE (1475-1507), Italian soldier, a figure typical of the tempestuous side of Renaissance life. A son of Rodrigo Borgia, who in 1492 became Pope Alexander VI, and Vannozza Catanei, Cesare was made an archbishop and a cardinal before he was twenty. He was dispensed from his orders in 1498, and in 1499 married Charlotte d'Albret, princess of Navarre. About the same time the king of France made him duke of Valentinois. He succeeded his brother Giovanni as gonfalonier, or captain-general, of the Church, and for the next four years, unscrupulous, fearless, and pitiless, fought to recover the provinces of Italy whose lords had rebelled against the sovereignty of the papacy. A brilliant soldier and a master of strategy and diplomacy, Cesare conquered Perugia, Siena, and Urbino, and was proclaimed duke of Romagna. His rule was



Cesare Borgia: from a portrait, reputedly by Giorgione, in the Accademia at Carrara

short but remarkable for its justice and order.

By the death of Alexander VI, in Aug., 1503, Cesare lost the basis of his power. The new pope, Pius III, lived only a few weeks; his successor, Julius II (Giuliano della Rovere), was an enemy of the Borgias. The lords of central Italy now had the papacy on their side, and Cesare surrendered at Naples on the promise of a safe-conduct from the governor Gonsalvo de Córdoba, the "Great Captain" of Castile. He was taken as a prisoner to Spain, 1504, and in 1506 escaped to the court of Navarre. Commander of the royal forces, he fell fighting at Viano, March 12, 1507.

The great qualities of Cesare Borgia were overshadowed by his indifference to human life and by the crimes committed to accomplish his will. Once in power, he governed justly and well by the standards of the day. Machiavelli, labouring for a united Italy, saw in him the one man who might accomplish this unity, and dedicated to Cesare II Principe (the Prince) his treatise on the art of government.

Borgia, FRANCESCO (1510-72). Spanish courtier, priest and saint, third general of the Jesuits. Born at Gandia in Spain, Oct. 28, 1510, son of the duke of Gandia, to whose title he succeeded in 1543, he was from boyhood attracted to religion. He served at the court of Charles V, married Eleanor de Castro, and was made viceroy of Catalonia. Three months after his

wife's death, March 27, 1546, he joined the recently formed Society of Jesus; in 1551 he resigned his estates and became a priest. He acted as commissary-general of the society in Spain and the Indies, was the friend and adviser of Ignatius Loyola, and in 1565 was appointed third general of the society. Borgia died in Rome, Sept. 30, 1572, and was canonised by Pope Clement X in 1671. His festival is kept in the R.C. Church on Oct. 10.

Borgia, LUCREZIA (1480-1519). Youngest of the five children of Rodrigo Borgia, afterwards Pope Alexander VI, and Vannozza Catanei. Born at Rome, April 18, 1480, she became a pawn in the diplomatic history of the period. At the age of 12 she was betrothed to a Spanish lord but, her father then becoming pope, he married her on June 12, 1492, to Giovanni Sforza. In 1497 Alexander, now allied with Naples, annulled the marriage, and in 1498 Lucrezia became the wife of Alphonso of Aragon, duke of Bisceglie, a relative of the king of Naples. In 1500 Alphonso was murdered by order of Lucrezia's brother Cesare, and for a short time Lucrezia retired from Rome. In 1501 she was married to Alphonso d'Este, son of the duke of Ferrara. Thereafter her life was devoted to the education of her children, to charitable works, and, after her husband became duke in 1505, to making her court at Ferrara a centre for poets and artists. She died of a miscarriage June 24, 1519. This beautiful woman, whose name has come to typify Renaissance subtlety, luxury, and immorality, was probably neither clever nor wicked; historical evidence fails to confirm the crimes imputed to her. Her name serves title to a novel by Bulwer Lytton; consult Lives, J. Haslip, 1953; M. Bellonci, Eng. trans. B. Wall, 1953.



Lucrezia Borgia: from a medal in the Berlin Museum, struck at Ferrara in 1503

Borgne, LAKE. Gulf in the S.E. of Louisiana, U.S.A., about 15 m. E. of New Orleans. An arm of Mississippi Sound, it extends N.E. to S.W. for 27 m., and is connected by the Rigolets and Chef Mentour passes with Lake Pontchartrain on the N.W. and by the Borgne canal with the Mississippi on the W.



Francesco Borgia. Saint and courtier: from the death mask preserved at Rome

Borgomanero. Town of Italy, in the prov. of Novara. It stands near the river Agogna, at an alt. of 1,005 ft., 19 m. by rly. N. of Novara. It is a junction on the line to Orta, Arona, and the Simplon route to Switzerland, and a centre of the silk and textile industry. Pop. (1951) 14,011.

Borgo San Donnino. For this town of Italy, the ancient Fidentia Julia, see Fidenza.

Borgo Sansepolcro OR SANSEPOLCRO. Town of Italy, in the prov. of Arezzo. It lies in the Apennines, in the upper valley of the Tiber, about 16 m. N.E. of Arezzo, with which it is connected by rly. The birthplace of Piero della Francesca (c. 1416-92), it has a cathedral, a handsome town hall containing Piero della Francesca's painting of the Resurrection and reliefs by Della Robbia, and a hospital dating from the Middle Ages. Two of its palaces were blown up by the Germans during the Second Great War. Pop. (1951) 12,623.

Borgu, BORKU, OR BARBA. Country of W. Africa, formerly an independent sultanate and at one time tributary to Wadai. The western portion forms part of the French territory of Dahomé, and the eastern forms part of Ilorin province, Nigeria. The country, which is bounded on the N. and E. by the Niger, consists mainly of an elevated plain, but some portions are mountainous. Much of its area is a desert basin, with drifting sand interspersed with fertile oases. It is inhabited by pagan Negro tribes and nomadic Arabs. In 1894 British and French expeditions advanced into Borgu, and Sir Frederick Lugard succeeded in negotiating a treaty with the king of Nikki, or sultan of Borgu, a few days before the French expedition arrived.

By the Anglo-French convention of June, 1898, western Borgu was assigned to the French and eastern Borgu to the British.

Borgu. Division of the British protectorate of Nigeria, West Africa. Bordered on the W. by Dahomé, on the N. and E. by the river Niger and on the S. by the Ilorin division, it forms part of Ilorin prov. in the Northern Region and covers an area of 10,900 sq. m. Mainly an elevated plain, British Borgu is for the most part desert. The people belong to the chieftaincies of Kaiama and Bussa (which are also the names of the principal towns) and are connected with the tribes of the Nikki in Dahomé. Pop. (est.) 76,000.

Borgu. Administrative circle in the French territory of Dahomé, West Africa. It was the western part of the former sultanate of Borgu. The chief towns are Nikki, Paraku, and Perere.

Boric Acid. Alternative name for boracic acid (*q.v.*).

Borinage (Fr., place of boring). District of Belgium, in the prov. of Hainaut. It lies around Mons, which is its chief town, and contains some highly productive coal mines. See Belgium.

Boring. Making or enlarging a hole in solid material. Boring implies rotary motion of a boring tool under the application of pressure or impact. Holes in wood are bored with awls and gimlets held in the hand; by bits and drills fixed in a brace; and by augers turned by a wooden handle. Boring, in the metal-working sense of the term, denotes rather the enlarging of an existing hole; the making of a hole in solid metal is termed drilling (*q.v.*).

Castings of parts of machinery, etc., are provided with "cored" holes, as left by a core of sand in the moulding process, having a rough surface. Such holes need to be "trued up" and "dimensioned" to the exact size required. This is done by boring; the piece of machine is set up in a lathe and rotated; a boring tool is brought to bear against the side of the hole, and the metal is gradually removed in fine shavings. The tool is traversed through the hole lengthwise, and is then set to take a further cut, the traversing being repeated. Boring removes only a small part of the metal at a time, as contrasted with drilling, in which the drill makes a hole of the finished size at one passage through the work. In an alternative method the boring tool is rotated between the lathe centres, and the work-piece, clamped to the saddle of the lathe, is traversed and brought against the cutting tool. See Lathe.

Boring. An operation carried out in earth and rock for a variety of purposes, *e.g.* for prospecting and geological research; for waters, brines, oil, and natural gases; to ascertain the nature of foundations; for shaft sinking, tunnelling, mining, and quarrying. There are two systems: (a) impact or percussion (sometimes termed churn drilling); and (b) rotary. The choice of method depends upon the diameter and length of hole required and the nature of the rock in which it is to be drilled. Percussive methods are

normally not so suitable as rotary for boring in soft rocks such as clays, soft shales, sands, etc., although with shallow borings this consideration is frequently overlooked in favour of their simplicity and low cost.

The boring action in the percussion system is obtained by the rapid lift and fall of a heavy steel chisel which shatters and pounds the rock into small fragments. Rotation of the tool is essential to prevent the formation of an elliptical hole in which the chisel might eventually wedge. The pulverised rock, mixed with water, is removed by a bailer or sludger, a length of pipe fitted with an inward opening valve at its base.

For shallow borings with a maximum depth of between 100 and 200 ft. the chisel bit is fixed to the end of steel rods, 1 in. sq. and 6 to 10 ft. long. A small, power-driven winch is used for hoisting and for supplying reciprocating motion which is obtained by alternately tightening and slackening a couple of turns of the rope supporting the rods around the drum of the winch. A tripod or mast, about 20 ft. high and with a pulley at the top, is necessary for handling the rods. In soft clays an auger may be used instead of the chisel.

Modern Equipment

The cable tool method in which a steel cable takes the place of the rods is now invariably used for deeper percussion-drilled holes. Modern equipment is portable and is frequently fitted with a folding or telescopic mast, thus obviating the need for a separate derrick. The drilling motion is obtained by an eccentric pulley, or other device, bearing against the drilling cable at a point just above the drum on which it is spooled. A second drum is provided for the bailer cable, whilst the handling of casing is facilitated by the provision of a third cable and drum. The drilling tools are attached to the cable by a rope socket and consist of jars, drill stem, and bit. The drill stem is a solid steel bar, from 6 to 42 ft. long, and its function is to give weight to the blow of the chisel. The jars may be likened to two links of a chain; at the bottom of the down-stroke they over-ride one another and on the up-stroke they open out again, jarring the tools as their ends come together and loosening the bit if it has wedged in the rock.

Rotary drilling methods employ a drilling bit screwed to the end of pipe (drill-pipe) and rotated on the

rock, the bit cuttings being flushed out of the hole by a stream of water or mud pumped down the pipe and emerging through holes in the bit. In the diamond drill the bit consists of a short length of heavy steel tube with its bottom edge set with diamonds. The larger models of diamond drills are fitted with a hydraulic feed for regulating the rate of advance of the bit. The diamond drill is limited to small diameters because of the expense in maintaining the crown, but since it produces an excellent core in hard rocks it is widely used, especially in metalliferous mining. A variant of this drill is the shot drill in which a plain steel crown is used and chilled-steel shot is fed into the drill-pipe and thence to the bottom of the hole. The rotation of the crown causes the shot to wear an annulus in the rock and so leave a core to be removed in the body of the drill. Because of the low price of the shot, this method is used to drill large as well as small diameter holes.

Boring in Oilfield Work

The standard hydraulic rotary method of drilling was developed primarily for oilfield work, and its success is due largely to the peculiar properties of the mud which is used for clearing the comminuted rock from the hole. During normal drilling all the rock in the borehole is broken and carried away by the mud. Various designs of bit are used according to the nature of the rock. When necessary, cores of rock may be taken, using special core barrels instead of the drilling bit. The top length of drill-pipe is of square section and is a sliding fit in square bushes in the rotary table, thereby enabling the tools simultaneously to rotate and descend as the hole is made. To speed up bit changing in deep holes the pipe is removed in 90 ft. lengths: this demands a derrick from 122 ft. to 136 ft. high. High pressure reciprocating pumps are used for pumping the mud into the drill-pipe through the swivel which provides the connexion between the stationary pumps and the rotating pipe. Small, complete, rotary drilling rigs, capable of reaching depths of 1,000 ft. or more, are mounted on motor trucks which carry, in addition, a small folding derrick which lies flat over the top of the truck when not in use.

In shaft sinking, tunnelling, mining, and quarrying the principal reason for boring is to enable explosive to be placed and fired in

the middle of hard rock, which is thereby broken into pieces of reasonable size for handling. The pneumatic drill is generally used for this work, and the holes are commonly up to 4 ins. in diameter and 25 ft. in length. There are various types of mounting and several drills may be operated simultaneously. With these machines holes can be drilled at any angle. The comminuted rock is removed either by air blast or by water passed through hollow drill rods.

Advantage of Rotary Drilling

The essential operation in prospecting, geological research, and foundation testing is the recovery of samples of rock from the bottom of the borehole. The percussion system yields a slurry of broken rock fragments which sometimes is confusing and makes geological interpretation difficult. Cylindrical cores of the rock can be recovered by a heavy percussion drilling rig, however, using a special tool. With rotary methods of drilling it is possible to recover almost a continuous cylindrical core except in soft and unconsolidated rocks.

When boring for water, brine, oil, or natural gas it is necessary to line the hole with steel tubing to prevent collapse of the sides, to provide suitable space in which pumps can operate, to prevent internal circulation from one permeable rock to another, and to give a means of controlling high pressure fluids. The last two considerations are of paramount importance in oil and gas wells.

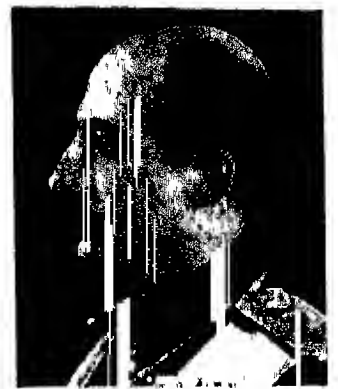
Water and brine wells rarely exceed 1,000 ft. in depth, are sometimes 30 to 40 ins. in diameter, and abnormally high pressures are not encountered. Percussion methods are generally employed because of their low cost and ability to perform well in hard rocks. The rotary method is preferable for deep borings in soft rocks, however, because of the rapid progress and the ease with which the lining tubes (casing) can be inserted.

Oil and natural gas wells are usually begun at diameters between 10 and 20 ins. and finish at diameters between 6 and 12 ins.; depths exceeding 10,000 ft. are not uncommon and a few borings are more than 15,000 ft. deep. In 1945 an exploratory oil well in Texas attained a depth of 16,655 ft. Important factors associated with the drilling of these wells are: the physical nature of the rock, usually soft and frequently unstable; the number of perme-

able rock zones to be penetrated and the nature of their fluid content; the method of production when oil and gas occur at different depths in the same well; and the probable oil and gas pressures. The rotary method is used almost exclusively for drilling these wells because, with normal control of the physical properties of the mud, rapid penetration with adequate protection of the sides of the borehole is assured, the entry of unwanted fluids can be prevented, high pressures which might cause blow-outs and gushers can be successfully combated, and handling of the casing is facilitated.

Accurate borehole surveys have made possible the practice of deliberate deviation of boreholes which is used when the drilling rig cannot be set immediately above its goal.

Boris III (1894-1943). Tsar of Bulgaria. Born at Sofia, Jan. 30, 1894, he was the eldest son of King Ferdinand and Marie Louise, daughter of the duke of Parma. On Oct. 4, 1918, he succeeded to the throne on his father's abdication. With his approval, Bul-



Boris III,
tsar of Bulgaria

garia became a fascist state in 1934. Boris achieved a diplomatic success, 1938, in obtaining his country's release from the punitive clauses of the Treaty of Neuilly. In the Second Great War he strove to prevent Bulgaria from being dragged into the conflict. Axis pressure and fear of Russia forced him to sign the Anti-Comintern Pact in 1941, and although the pro-Russian sympathies of the majority of his subjects deterred Boris from bringing Bulgaria into the war against the U.S.S.R., he joined in the Axis attacks against Greece and Yugoslavia. He visited Hitler, March, 1943, ostensibly to discuss the defence of the Balkans against possible Allied landings. He died at Sofia in unexplained circumstances, Aug. 28, 1943. Boris married in 1930 Giovanna, third daughter of King Victor Emmanuel III of Italy, and was succeeded by their son, Simeon II (b. 1937).

Boris Godunov (c. 1550-1605). Tsar of Russia. The son of a certain Theodore, he appeared at the court of Ivan the Terrible about 1570, served in the field, and married a member of the court

circle. His sister Irene married Ivan's son Theodore, and when Theodore became tsar, Boris was made one of the regents. During c. 1584-98 he was the real ruler of Russia, and was in some respects singularly enlightened, although he aggravated the burden of serfdom. He established towns, advanced education and religious liberty, encouraged traders, and placed settlers in Siberia, besides engaging in the more usual activity at that date of extending his country's boundaries. In 1598 the tsar Theodore died and Boris was chosen tsar by a national assembly. He died April 13, 1605.

Boris Godunov is the hero of a verse drama by Pushkin which was the basis of Moussorgsky's libretto for his opera *Boris Godunov*, first produced at the Mariinsky Theatre, St. Petersburg, in 1874. Rimsky-Korsakov's expanded version of the work was produced at St. Petersburg in 1896, and in this version the great Russian bass singer Chaliapin made his London debut at Drury Lane in 1913.

Borislav (Pol. Boryslaw). Town of Ukraine S.S.R., in Drohobich region. In the area ceded to Poland by Russia by the treaty of Riga, 1921; allotted to Russia in the Russo-German partition of Poland 1939; and ceded by Poland to Russia in 1945 (ratified 1946), it lies in the Carpathian Mts., 5 m. S.W. of Drohobich, and is an important petroleum centre; it has also natural-gas wells and produces ozokerite as well as making equipment for drilling.

Borisoglebsk. Town of the R.S.F.S.R., in Voronezh region. On the river Vorona, 120 m. E.S.E. of Voronezh, it is served by rly. and trades in grain, cattle, wool, leather, soap, and bricks. Pop. (est.) 55,000.

Borisov. Town of White Russia S.S.R., in Minsk region. On the Beresina river, 50 m. N.E. of Minsk, it has breweries, tanneries, and tobacco and match factories. Near Borisov Napoleon made his disastrous passage of the Beresina river, Nov., 1812. It became Russian in 1795. It saw fierce fighting July 2-9, 1941, when the Germans were trying to cross the Beresina in the Second Great War. It was recaptured by the Russians after bitter street fighting, June 30-July 1, 1944. Pop. 15,250.

Borkum. Island of Germany, one of the Frisian group. Situated at the mouth of the Ems, about 9 m. from the coast of Holland, it is about 5 m. long and $2\frac{1}{2}$ m. broad, and before the First Great

War gained renown as a pleasure resort. It has about 3,000 inhabitants and the rearing of cattle is the chief industry. For administrative purposes it is in the prov. of Hanover. The German seaplane base here was raided by Allied aircraft in the Second Great War; and British troops landed on the island in May, 1945. See *Heligoland*; *Sylt*.

Borlase, William (1695-1772). English antiquary and naturalist. Born at Pendeen, Cornwall, Feb. 2, 1695, he was educated at Tiverton School and Exeter College, Oxford, and became rector of Ludgvan in 1722, and vicar of St. Just in 1732. He was made F.R.S. in 1750. His chief works were *Antiquities of Cornwall*, 1754; *Observations on the Islands of Scilly*, 1756—which gained the praise of Dr. Johnson—and *Natural History of Cornwall*, 1758. He supplied Alexander Pope with the fossils and minerals to decorate his grotto at Twickenham, and presented his geological collection to the Ashmolean Museum, Oxford. He died Aug. 31, 1772.

Bormann, Martin (1900-45?). German politician, and Hitler's deputy. He was born June 17, 1900, at Halberstadt, and after the armistice of 1918, joined the German Free Corps. In 1923 he received two years' imprisonment for his part in the Munich "putsch." In 1928 he was



Martin Bormann,
German politician

placed in charge of the Nazi party press in Thuringia, and in 1933 was elected to the Reichstag and appointed chief of staff to Rudolf Hess (*q.v.*). When Hess flew to Scotland in May, 1941, Bormann was made his successor, and in Feb., 1942, became party chancellor. An embittered opponent of Christianity, he declared in a book that Christianity and Nazism are "irreconcilable concepts." In the later stages of the Second Great War Bormann mostly supported Himmler. When the Russian army captured Berlin, April, 1945, Bormann was in the chancellery with Hitler. He was reported to have been killed in a tank explosion, while making an attempt to escape, but his death remained unconfirmed. Tried in his absence at the Nuremberg war criminals' trial, he was sentenced to death, Oct., 1946.

Bormio. Town of Italy, in the prov. of Sondrio. It stands on the river Adda, at the foot of the Stelvio Pass, being 4,020 ft. high. It has medieval towers, and old churches. At Bagni di Bormio, near by, there are hot sulphur baths, supplied by springs which were known to the Romans, being mentioned by Cassiodorus. The town was of military importance during the Middle Ages.

Börne, Ludwig (1786-1837). German political writer. Born at Frankfort, May 6, 1786, the son of a Jewish banker, he studied medicine at Berlin, and read law at Heidelberg. During 1811-13 he held a government office at Frankfort. In 1818 he renounced Judaism and, receiving baptism, changed his name from Lob Baruch to Ludwig Börne, and began to attack the government as editor of various journals, notably *Die Wage* (The Balance).

After the French Revolution of 1830, Börne settled in Paris, where he published *La Balance*, with the aim of an alliance between the intellectuals of France and Germany, and where he died of consumption, Feb. 12, 1837. He had a fierce quarrel with Heine, formerly his ally. His strength was in satire and invective, displayed forcibly in *Briefe aus Paris* and in *Menzel der Franzosenfresser*. *Consult Life*, H. Heine, Eng. trans. T. S. Egan, 1881.

Borneo. Large island of the East Indian Archipelago bounded N. by the South China Sea, W. by the Karimata Strait, E. by the Celebes Sea and the Strait of Macassar, S. by the Java Sea. Its extreme length is about 850 m., breadth about 600 m.; area about 290,000 sq. m., exclusive of numerous islands. The pop. is estimated at 4,000,000, but is possibly greater as much of the country is only partially explored.

Politically Borneo is divided into four parts: (1) North Borneo, a British colony; (2) Brunei, a sultanate under the protection of the British crown; (3) Sarawak, a British colony; (4) Kalimantan (formerly Netherlands Borneo), a province of Indonesia.

The principal native people, aboriginal Indonesians called Dyaks, is divided into numerous tribes, formerly noted for taking heads as trophies in warfare. Chinese are numerous, and form large trading and mining communities. Malay traders and fishers are scattered along the rivers.

The surface generally is mountainous. There is a central group

of mountains from which other ranges radiate, but the systems are confused. The main chain extends in a N.E.-S.W. direction, with heights of from 7,000 ft. to 8,000 ft.; a considerable range in the N. rises in its highest peak, Mt. Kinabalu, to about 13,500 ft. There are few traces of volcanic action, and no active volcanoes.

The rivers, all the larger of which take their course from the central group of mountains, are

most important are Pontianak, Kuching (capital of Sarawak), Brunei, Jesselton (capital of North Borneo), Sandakan, Balikpapan, and Banjarmasin. Roads and railways are few, but there are good internal and external communications by air.

PRODUCTS. Borneo is rich in all kinds of tropical products, and the luxuriant flora includes many orchids. Ironwood is abundant. Numerous palms—*e.g.* the

were intensively developed by the Dutch in the 1930s. Gold and silver are worked by the Chinese in west Kalimantan. Bauxite and manganese are found in Sarawak, which also has extensive coal deposits. In Kalimantan coal is found on Laut and the surrounding islands.

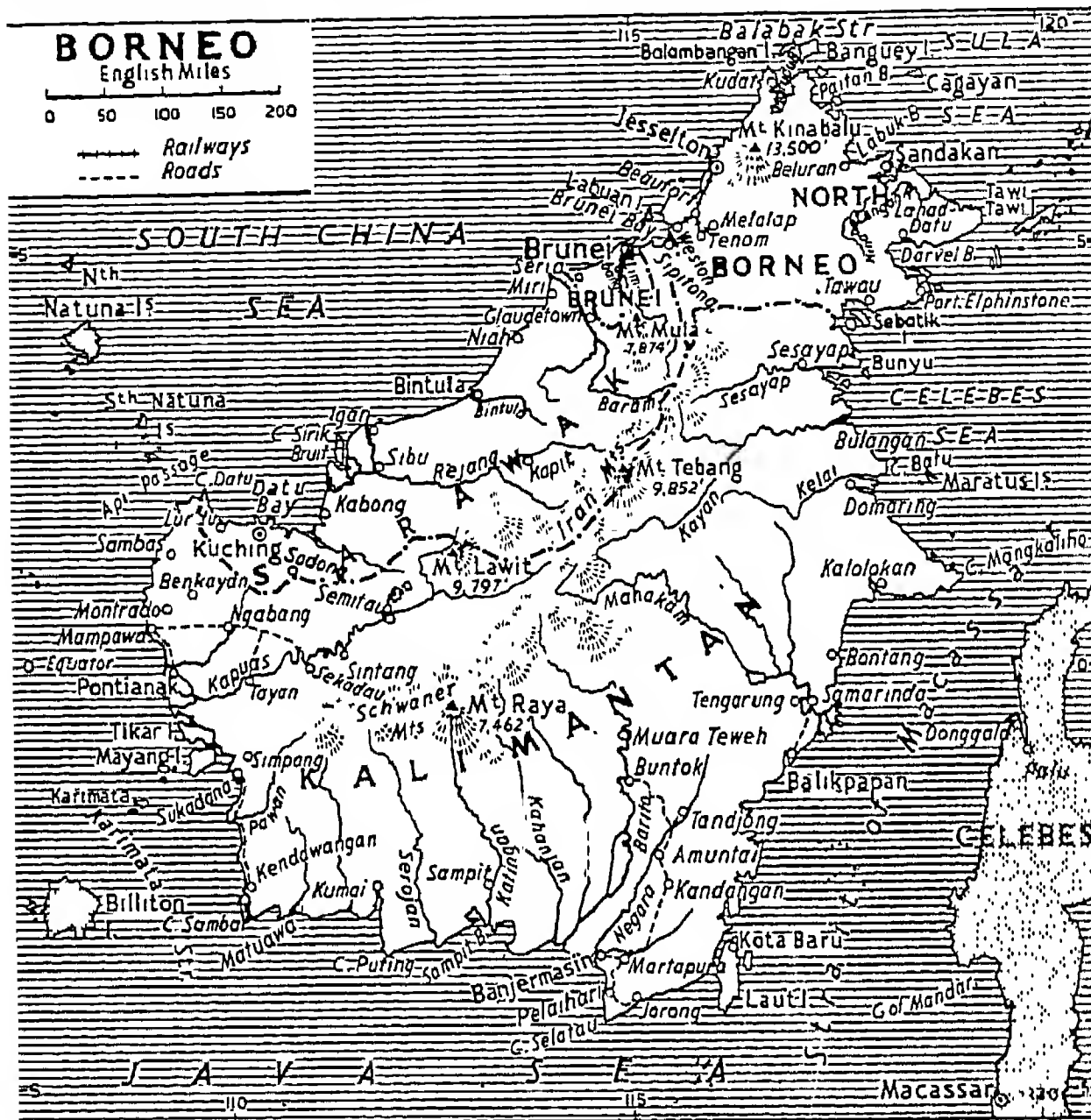
HISTORY. There is little evidence of Hindu art or other influence in Borneo; but Hindus made some small settlements in the S.W. of the island. Muslim influence began when, *c.* 1520, Muslim traders, disturbed by the Portuguese conquest of Malacca in 1511, transferred their h.q. to Brunei whose raja, embracing Islam, started to spread that religion, and his own dominion, along the north coasts. In 1521 Magellan's ship *Victoria* called at Brunei after her disastrous visit to the Philippines (where Magellan himself and many of his crew were killed). In 1545 the Portuguese arrived and concluded treaties with the sultan of Brunei and gave the name of his capital city to the whole island (Borneo being a form of Brunei). The Dutch reached Borneo early in the 17th century; they set up trading posts at Banjarmasin *c.* 1606, and at Sukadana and Sambas in 1609. Their representatives at Banjarmasin were treacherously attacked and murdered in 1669. British merchants who set up a trading post at Banjarmasin in 1698 were similarly wiped out in 1707. Portuguese missionaries also, attempting to penetrate into the interior to reach the pagan Dyaks, were murdered.

During the Napoleonic wars the British took over the Dutch trading posts, returning them after the conclusion of peace; and Dutch authority had spread over all southern Borneo by 1855.

The British established protectorates in the north of Borneo during the 19th century (*see* Borneo, North; Brunei; Sarawak), and the boundaries between British and Dutch territories were defined in 1891.

The interior of Borneo remained virtually unknown until exploration of the river valleys began in the 1820s. Archaeological excavation in Sarawak has brought to light examples of T'ang pottery.

During the Second Great War the Japanese made their first landing in Borneo in Sarawak on Dec. 16, 1941; with their occupation of Banjarmasin on Feb. 14, 1942, the whole island came under their control. Australians landed



important, numerous, and generally navigable. They have formed the main avenues of exploration, and along their banks the greater part of the population is settled. The most important in their order clockwise round the coast, from the N.W., are the Rejang and the Baram in Sarawak; the Kayan (or Bulangan), the Mahakam, the Barito, navigable for 53 m., and the Kapuas, navigable for 300 to 400 m., in Kalimantan.

Danaus (otherwise lakes) are numerous along the rivers, many of which have extensive mud flats at their mouths. The coasts are in general swampy and flat, with few indentations or good natural harbours. Numerous islands, many formed by deposits from the rivers, lie around the coasts, the principal being Balam-bangan, Banguey, Laut, the Kari-mata group, and Labuan.

The chief towns are situated near the mouths of rivers; the

coconut, the betel-nut, the rattan, and the sago-palm—flourish. Important exports are timber, copra, firewood, rubber, tobacco, pepper, hemp, and sago. Fauna includes orang-utan, gibbons, elephants, deer, leopards, honey bears, badgers, porcupines, and king cobras. The rhinoceros is found in the north, but is nearing extinction. More than 600 species of tropical birds are found; one of them, the swiftlet, makes edible bird-nests which are exported. Crocodiles are found near river-mouths, and sharks frequent coastal waters. Fishing is important, and dried and salt fish are exported.

The great mineral wealth of Borneo includes petroleum, phosphates, gold, bauxite, manganese, coal, diamonds, and tin. The main oilfield is at Seria, Brunei, where more than 5,000,000 tons of crude oil are extracted every year. The oilfields of Kalimantan near Balikpapan and Martapura

at Sandakan on May 1, 1945; fighting was continuing when Japan surrendered in Aug.

After the war, northern Borneo reverted to British possession; southern (Netherlands) Borneo became part of the republic of Indonesia and was in 1950 re-named Kalimantan.

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Borneo, NETHERLANDS. Name of that part of Borneo formerly part of the Netherlands East Indies, merged in 1950 in the republic of Indonesia and renamed Kalimantan. See Borneo.

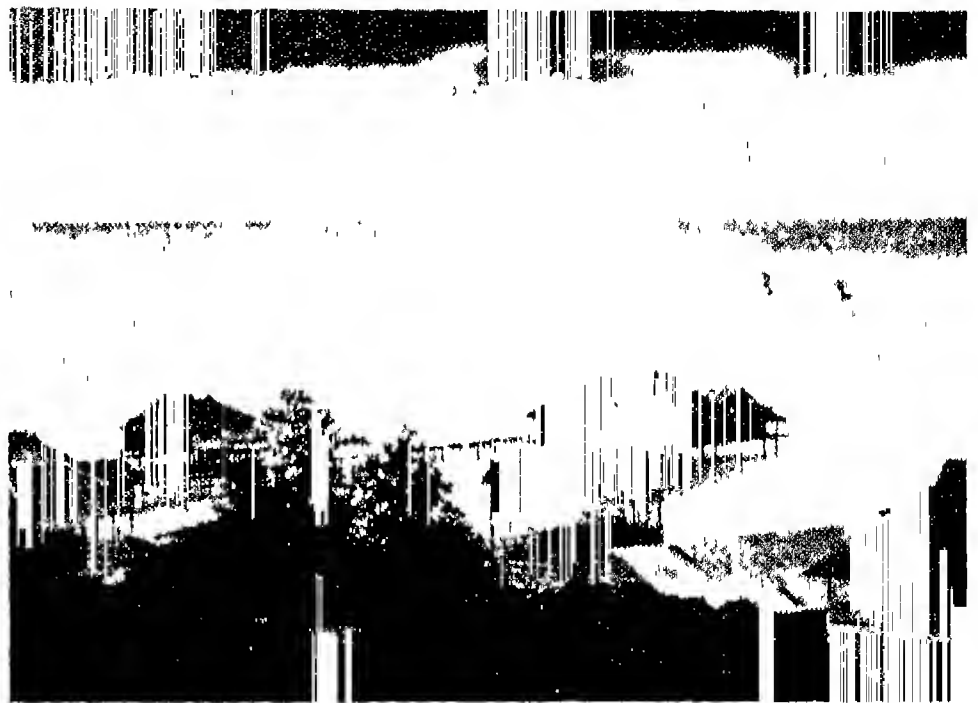
Borneo, NORTH. British colony in Borneo, East Indies. Comprising the northern part of this island and including Labuan and other adjacent small islands, it has a coastline running some 850 m. from Brunei Bay in the W. to Marudu Bay in the N. and thence to Sebatik I. in the E. and is bounded on the S. by the British colony of Sarawak and by Kalimantan, Indonesia; area 29,388 sq. m. From a flat coastal belt the thickly forested country rises through low hills to a central mountainous region interspersed by plains and dominated in the W. by the Crocker Range which in Mt. Kinabalu reaches some 13,500 ft. Flowing E. to the Celebes Sea, the Kinabatangan (350 m.) is the longest of numerous rivers, many of which are important as means of communication and sources of water. Though tropical, the climate is equable, with heavy rainfall during Oct.-March; irrigation and land reclamation have been steadily developed. Plantation rubber is of basic value to the colony's economy, and Manila hemp is significant. Rice is widely grown. Timber, firewood, tobacco, copra, and cutch are also produced and exported. There are extensive inshore fisheries and fish is a staple food; turtles and prawn are caught. Petroleum, chromite, manganese, copper are among the colony's minerals.

The colony is divided into three residencies—W. Coast, E. Coast, and Labuan and Interior—with h.q. at Jesselton, the capital

(pop. est. 11,000), Sandakan (pop. est. 14,000), and Labuan respectively. There are harbours accommodating ocean-going vessels at Labuan and Jesselton (shipping rubber) in the W., and Sandakan and Tawau (both shipping timber) in the E. A railway follows the coastline from Jesselton to Beaufort where it turns inland to Melalap (96 m.); from Beaufort a branch line runs to Weston (20 m.) whence launches connect with Labuan; there are more than 400 m. of roads, mainly in the W. coast area. Labuan is an international airport with services to Europe, Australia, Hong Kong, and Tokyo; Jesselton and Sandakan are secondary airports; there is also an internal air service.

Traditionally, North Borneo had associations with China in the 14th century and was first visited by Europeans 200 years later. The East India co. had stations here 1773 and 1803 but abandoned them. At this time the territory was nominally ruled by the sultans of Brunei and Sulu by whom it was ceded to the British North Borneo co. in 1881; declared a British protectorate in 1888, it remained under the co.'s administration until the Japanese occupation, 1942-45. On July 15, 1946, North Borneo became a crown colony in which the existing colony of Labuan was incorporated.

North Borneo is administered by a governor assisted by an executive and a legislative council, chiefs and village headmen being responsible for local government to district officers in each residency. The Sarawak-N. Borneo-Brunei conference, a standing body set up in 1953, promotes cooperation between these territories. There is a govt. health service and both govt. and mission schools. The population, of which almost half lives in the W., is of mixed blood, the Dusun, Muruts, and Bajaus being the chief native peoples. Pop. (1951) 334,140, of whom 74,370 were Chinese and 1,210 Europeans. Consult British North Borneo, O. Rutter, 1922; Kinabalu, C. M. Enriquez, 1927; Annual Report, H.M.S.O.



Borneo. Pile-dwellings used by Malay inhabitants of Jesselton, capital of British North Borneo

Borneo Camphor (*Dryobalanops aromatica*) Evergreen tree of the family Dipterocarpaceae, native to Borneo and Malaya. It attains a height of 100 ft., has oval shaped, shining, leathery leaves, and clusters of yellow flowers. A liquid called camphor oil is obtained by incising the bark; and when the timber is cut up a solid kind of camphor is found in cavities of the wood, harder and more brittle than common camphor, but greatly esteemed by the Chinese.

The wood of this and other species of *Dryobalanops* is sometimes called kapur. Dull red-brown in colour, with an aromatic scent, it makes an excellent flooring timber.

Borneol OR BORNEO CAMPHOR. Crystalline alicyclic alcohol with a smell very much like camphor, with which it is often confused. It is obtained commercially from oil of turpentine; from other oils distilled from species of *Pinus*, and by reducing camphor with sodium in alcohol. It has been identified in oils of citronella, thyme, lavender, rosemary, and nutmeg.

Bornholm. Danish island in the Baltic Sea. It lies 90 m. E. of Zealand and 25 m. S. of Sweden; area 227 sq. m. It is mainly a low plateau, rocky in the N., rising to an alt. of 530 ft. It contains granite, coal, porcelain clay, blue marble, and limestone. The varied landscape and mild climate have made it a favourite holiday resort. Pottery making is the chief industry, and cattle rearing, fishing, and arable agriculture are carried on. The chief town and harbour is Rønne, and there are several other small towns, that of Nexsø being connected with Rønne by rly. Bornholm belonged successively to Denmark, Lübeck, and Sweden, becoming Danish again in 1660. During the Second Great War a German

"secret weapon" research station was here. After the German surrender of May, 1945, the island was occupied by the Russians until April, 1946. Its old name, Borgundarholmn, means Burgundians' Island. Pop. (1950) 48,134.

Bornu. Province of British Nigeria, West Africa. In the Northern Region, it is bordered on the N. by French West Africa, on the W. by Kano and Bauchi provs., on the S.E. by Adamawa prov., on the N.E. by French Cameroons; area 45,733 sq. m. Mainly an alluvial plain, sloping from high ground in the S.W. towards Lake Chad in the extreme N.E., with desert land in the N. and bush and scrub in the S., Bornu is drained by the Komadugu, Yobe, and other rivers flowing into Lake Chad. Lion are found in some parts, and gazelle around Lake Chad. Temperatures range from 105° F. in May in the N. to 55° F. in Dec.-Jan. in the S.; water is obtained from wells and boreholes.

The country is on the whole fertile: ground nuts, cassava, millet, yams, beans, and cotton are grown. From the railhead at Nguru in the N.W. there is direct communication via Kano with the coast; airservices link Maidugari, the prov. h.q., with Jos and Kano. There are five divisions (the original emirates) in the prov.—Bedde, Biu, Bornu, Dikwa, and Potiskum. Pop. (1952 est.) 1,596,000.

The ancient and powerful kingdom of Bornu, which once extended to the borders of Egypt, had its capital at Kuka on the r. Yobe. Of Negroid stock, its people have been Muslims from the 13th century, the principal group being the Kanuri (which is also the name of their language). Famed as horsemen, they made effective use of mounted warriors in warfare. In 1901 N. Bornu, with the tributary state of Zinder, was incorporated in French West Africa, S.W. Bornu in German Cameroons; the rest was taken under British protection. The former German territory was placed under mandate in 1919, under U.N. trusteeship in 1946, a strip in the W. being administered by Great Britain as an integral part of Nigeria, the remainder by France.

Boro Budur (Great Buddha). Buddhist temple in Java, noted for its architecture and sculpture. Built on a hill near the confluence of the Progo and Ello, 15 m. N.W. of Jokjakarta, it is 118 ft. high, and about 2,000 ft. in circuit at the base, and dates probably from the

7th century. It consists of six square storeys, and is surmounted by a large cupola for the holy relic (no longer extant), surrounded by 72 small cupolas on three circular platforms.

Borodin, ALEXANDER PORPHYRIEVICH (1834-87). Russian composer. Born at St. Petersburg, Nov. 12, 1834, the illegitimate son of a prince of Imeretia, he was educated for the medical profession, though he early showed a great love of music. After studying abroad he was at 28 appointed assistant professor of chemistry at the academy of medicine, St. Petersburg, and later founded there the school of medicine for women, where he lectured from 1872 till his sudden death. In 1862 he met Balakirev and took up music seriously. He wrote only 21 works. The best known of these, the opera *Prince Igor*, which was finished after his death by Rimsky-Korsakov and Glazounov, was first performed in 1890. Borodin died at St. Petersburg Feb. 28, 1887.

Borodin, MIKHAIL (1885-1953). Russian Communist journalist and organizer. Born in Czecho-Slovakia and educated at Valparaiso University, Borodin went to Russia soon after the 1917 Revolution. He later carried on active Communist propaganda in Spain, Mexico, the U.S.A., and the U.K., and when in 1923 Sun Yat-sen appealed on Moscow for help, a Bolshevik mission headed by Borodin was dispatched. Under Borodin's guidance the Kuomintang was reorganized on Communist lines and a military academy was set up: this, directed by Chiang Kai-shek, produced the officers to command the 8th route army of 50,000, led by Chiang, that freed northern China from its war lords during 1926-28 and unified the country. In 1928 Borodin and his mission were compelled to return to Moscow where Borodin became editor of the *Moscow Daily News*. His later history is obscure, but his death in 1953 in a Siberian prison camp, to which he had been sent in 1949, was announced in the Chinese Communist press.

Borodino, BATTLE OF. Fought between the French under Napoleon and the Russians, Sept. 7, 1812. Napoleon, invading Russia, had reached the river Kalatscha, on which stands the village of Borodino, 70 m. W. of Moscow. The French attacked on the 7th, but at first neither side gained the advantage. There was some

specially desperate work around the temporary fortifications thrown up by the Russians, who held their ground well until Napoleon was in a position to use his artillery and cavalry upon them. He did this with tremendous effect, and the result of a great cavalry charge was that the whole of the Russian line gave way, leaving Napoleon an open road to Moscow.

Borodino is famous for the severity of its losses. The Russians lost 40,000 out of 110,000 engaged; the French rather fewer, 25,000 perhaps, out of a somewhat larger army. The losses, however, were chiefly among their allies—Germans, Dutch, and others. Napoleon directed the operations on his side, Ney, Davout, Junot, and Eugène Beauharnais being his chief lieutenants. Kutusov commanded the Russians.

Boron. Non-metallic element which does not occur in the free state in nature but which is widely diffused in crude borax and borate minerals. It was first prepared by Davy in 1807 by the electrical decomposition of boracic acid. The next year Gay-Lussac and Thénard obtained it from boric oxide as a chestnut brown amorphous powder, and in 1856 Wöhler and Deville prepared it in a crystalline form, which is hard and black, with a melting point of about 2,300° C.

In some of its properties boron resembles carbon and silicon, but it is a more powerful reducing agent than either. Its atomic number is 5; atomic weight 10.82. It can be obtained by several methods, e.g. by heating potassium in the vapour of boron trichloride, or from boron bromide by passing the vapour through a high-tension arc. Boron combined with hydrogen and nitrogen forms solid substances; with fluorine, gaseous boron fluoride; with chlorine and bromine, liquids; and with sulphur, solid compounds. Three oxyacids of boron are known. Boron is used as an alloying element in the manufacture of steel, minute quantities rendering the metal very hard. In the form of calcium boride it is used as a deoxidiser for copper, brasses, and bronzes.

Bororos. South American Indian tribe. Living near the Paraná and the Paraguay head-waters, they are tall (5 ft. 8½ ins.) and medium-headed. They are primitive hunters, using long bows and arrows, and have no canoes, domestic animals, or agriculture. The men occupy communal huts for implement making and tribal

counsel; family huts shelter the women and children.

Borotra, JEAN (b. 1898). French lawn tennis player. He became famous by winning the Wimbledon championship in 1924, a victory repeated two years later, with an unsuccessful final in between, and was probably the most brilliant and popular of the "Four Musketeers" of France (the others being Henri Cochet, René Lacoste, and Jacques Brugnon). With Brugnon he won the doubles at Wimbledon in 1932 and 1933. He was said to have contested more Davis Cup matches than any other player, helping France to hold the trophy from 1927 until beaten by Great Britain in 1933. Eleven times successful in



Jean Borotra, French lawn tennis player

the London covered courts tournament, Borotra won more than 50 championships. After the fall of France in 1940 he was appointed by Pétain to take charge of sport and civic education, but was arrested in Laval's "purge" in Dec., 1942. Liberated from a prison camp in Tirol, May, 1945, he was found not to have collaborated with the Germans, and re-entered first class tennis 1948. He was made chevalier of the legion of honour in 1930.

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in all, tells what great men have houses in them, and gives information as to their inhabitants and their resources. In the first place, it appears that they are generally in a decayed and depopulated condition; the goldable or taxpaying burgesses of 1086 comprise only some 40 p.c. of those who flourished in 1066, yet they have the same amount of geld to pay. Secondly, the royal control over them has much increased. Thirdly, a large Norman-French immigration has changed the character of the burghal population, still further dissociating the borough from the system of national defence. The military centre of the Norman system of defence was, indeed, the feudal castle and not the county borough.

BOROUGH: GROWTH OF THE TOWN

* T. G. Williams, Author of *The Peopled Kingdom*

In this article is described the way in which the town, especially in England, became an important unit in the social system. See also County; Guild; Local Government: Representation, etc.

The borough is a type of town peculiar to England, although it has close affinity with the German burg, the French bourg, the Scandinavian borg, and the Scottish burgh. The term is derived from the Old English burh, originally meaning a fortified place. It was generally applied to the castle and courtyard of the great noble, but in its widest connotation every man's house was his burh, enjoying such peace as he was able to maintain within its borders.

The Anglo-Saxons did not love towns. They allowed the Roman municipalities to fall into decay; they preferred to live in open villages rather than in walled cities, and to engage in agriculture rather than in industry and commerce. A change, however, was forced upon them by the Danish invasions of the 9th century. They were unable in their hedge-encircled country-settlements to protect themselves against the formidable professional armies of their Viking assailants. The whole defensive system of the land had to be reorganized by Alfred and his successors, and one of the most important and effective features of their new military system was the founding or development of a group of country burgs or fortresses. In Germany about the same time Henry the Fowler employed the same method of defence against the Slavs and Magyars.

Thus the burg of the 9th and 10th centuries was primarily the shire-fortress, and the principal burgesses were the military men whose task it was to maintain and

defend the walls. No doubt there was also, as a rule, an ancient agricultural community within and without the walls. Gradually, too, owing to the exceptional security which they allowed, and to the unusual amount of traffic of which they became the centre, a new industrial and commercial community was formed in most burgs. But the burg did not begin as either a rural township or an industrial emporium; it began as a military fortification. As the burg-moots increased in importance, the supremacy of the shire-moots relatively declined. The main resistance to the Danes was organized by the burghers, and as territory was recaptured it was consolidated by the creation of new burgs, or boroughs as they may now be called. The five boroughs of Mercia: Derby, Nottingham, Stamford, Leicester, and Lincoln, originated in this way, and four of them gave their names to the shires which were reorganized around them. When the Danish peril had passed, the boroughs gradually changed their character and became centres of trade. The decay of the military organization of the boroughs, and the decline of the belligerent efficiency of the Saxon burgesses, help to explain the ease with which the Normans in the 11th century effected the conquest of England.

The Domesday survey, made under William the Conqueror in 1085-6, first gives an insight into the distribution and constitution of the boroughs of the realm of England. It enumerates some ninety

If, however, under the Normans the boroughs finally lost their original military importance, they gained immensely in economic, social, and political consequence. The strong government established by William the Conqueror and his successors was extremely favourable to the development of commerce. The new connexion which England secured with the Continent opened up numerous avenues of prosperity. The heterogeneous burghal communities, lacking the natural affinity which gave solidarity to the agriculturists of the rural townships, began to form themselves into voluntary associations called merchant guilds. The possession of a merchant guild became in the 12th century the distinguishing mark of municipal independence. The government of the borough was in the hands of the leading guild members.

Growth of the Guilds

As the guilds grew in wealth and importance they bargained with their immediate overlords or with the crown for the commutation of the dues and services owed by individuals. In place of these a fixed sum was rendered annually by the community, the individual shares being determined by agreement among the burghers themselves. They further began to seek and to secure by purchase from impecunious kings, such as Richard I and John, charters of liberties by means of which they gained such valuable grants as freedom from feudal services; exemption from financial exactions of the sheriff; the right to have courts of their own and to determine their own modes of trial; the right to establish markets and fairs having a monopoly of trade over wide areas; and the right to

elect their own officers and to enact their own by-laws. The model for these charters was the ancient one of the citizens of London, confirmed by William the Conqueror.

These privileges, procured at a great price and maintained by the repeated purchase of confirmatory charters from successive kings, were so valuable that they raised the free burgesses of these enfranchised communities to a position of peculiar power in the kingdom. In particular the burgage tenure that prevailed in boroughs—a tenure free from feudal burdens and involving liberty both to sell and to devise—was so much more attractive than any other form of tenure known in the Middle Ages that there were few who did not desire to share its advantages. Hence many towns which had grown up on royal demesne, or on the estates of nobles and churchmen, began to petition their lords for charters conferring upon them the rank of boroughs. Thus, for example, in 1294 Pontefract purchased burghal privileges from Roger de Lacy for three hundred marks (£200). Similarly Bury St. Edmunds was raised to the rank of a borough by concessions which were granted by Abbot Samson and his successors.

By the 13th century the ninety boroughs of Domesday had been increased to about 166. Up to that time the status of a borough had presented many advantages and no drawbacks, as compared with the status of an unchartered town. But in the 13th century a new factor of great importance was introduced. In 1265 Simon de Montfort for the first time summoned representatives of the boroughs to attend the national parliament. The precedent thus established was followed by Edward I and by all subsequent kings. The contributions of the wealthy and privileged communities of burgesses were too valuable to be allowed to lapse. Hence the boroughs found themselves, to their annoyance and alarm, saddled with the duty of sending members to parliament.

Representation in Parliament

This novel duty had two unpleasant consequences: first, the boroughs had to pay wages to their members at a rate fixed by the government, amounting to 2s. a day; secondly, they were taxed on a higher scale than the rural districts by which they were surrounded. So burdensome were these new imposts that many towns which had become boroughs managed in one way or another—

some by bribing the sheriff not to send them writs; one, at least (Torrington), by royal charter—to slip back into non-burghal obscurity. So rapid was the decline that in the 15th century a statute had to be passed to the effect that a borough which had once sent members to parliament should not be allowed to escape the burden of so doing. Nevertheless, in 1485 only about 100 parliamentary boroughs remained.

Value of a Borough Vote

By 1485, however, the peculiar privileges which in Norman and Plantagenet times had been so valuable had lost much of their worth. Commerce had escaped from the control of the merchant guilds; feudal services had become generally obsolete; national courts had superseded both burghal and manorial courts; the monopoly of markets and fairs had been broken. The main distinction between the chartered borough and the unchartered town was the possession or non-possession of the parliamentary franchise. But this franchise had become more important and more valuable as the power of the nobles and the clergy waned, and as the power of the third estate increased. A borough vote became, indeed, a marketable commodity which would often fetch a high price. The borough of Oxford on one occasion, when in want of money, went so far as to offer its representation for sale at £2,000. The Tudor and Stuart kings tended to create new boroughs on the royal demesne, primarily in order that they might control the parliamentary elections therein. They were more able to do this because the government of the new boroughs was established on oligarchic principles, the franchise being exercised usually by the mayor and aldermen. Only in the more ancient boroughs was there a democratic franchise, and some of these found themselves under Charles II forced or persuaded to surrender their charters on the pretext that there had been irregularities, and to accept substitutes which nominated supporters of the royal prerogative and the Catholic succession as members of the corporations.

The 18th century saw a further marked decline in the standards of administration, which became generally corrupt and inefficient. Venality was rife, offices being sold to the highest bidder, and there was much absenteeism. Members of the corporation held offices for life and vacancies were

filled by nomination. Some boroughs fell into rapid decay with the shift of population, but privileges were still maintained. The corporations ceased to be, as they once were, zealous upholders of popular liberties and became parasitic growths.

While this deterioration was going on in many of the chartered boroughs, towns were springing up, particularly in the new industrial areas of the Midlands and the N. of England, which enjoyed none of the privileges of incorporation and which were unrepresented in parliament. The balance was partly restored by the Reform Act of 1832 and the Municipal Corporations Act of 1835. By the former several of the decayed and rotten boroughs were deprived of their parl. representation and the seats redistributed more equitably. The borough franchise was made uniform. By the second great measure of reform the anomalies of borough government were removed and a common system of administration by mayor, aldermen, and councillors imposed. The corporation was now held in law to include all the burgesses or electors, and its powers were defined.

Growth of Urban Centres

In the hundred years which followed the Municipal Corporations Act the population of Great Britain expanded rapidly. There was an exodus from rural to urban areas and, as industries expanded, villages grew into towns. Moreover, the scope of government itself was expanding as *laissez-faire* was giving place to schemes of social welfare. Consequently new local authorities had to be created to provide and supervise education, sanitation, street-lighting, road-maintenance and the like, and frequent adjustment had to be made of the powers and responsibilities of urban and rural councils. The Local Government Act of 1888 ordained that a town on reaching a pop. of 50,000 could apply to be given the status of a county borough, whereby it could exercise not only the functions of a borough but of a county as well. Later, on account of the reluctance of the counties to be deprived of the wealthiest areas within their boundaries, this minimum was raised to 70,000.

Boroughs vary considerably in size. Winchelsea has fewer than a thousand inhabitants; the city of Birmingham has over a million. There is no longer any necessary association of a borough with separate parl. representation since

electoral areas have been re-drawn on other principles.

London, by reason of its great size and importance, was omitted from the operation of the Act of 1835. That part of it known as the City has still its medieval constitution, to a great extent unaltered. The rest of London now consists of twenty-eight metropolitan boroughs, each with its mayor, aldermen, and council. For the more efficient organization of municipal services over other large, closely populated areas, there have been many instances of neighbouring towns merging into larger units, *e.g.* the merging of the pottery towns of Stoke, Hanley, Burslem, Longton, Fenton, and Tunstall into the county borough (now city) of Stoke-on-Trent in 1910.

Borough, THE. Name sometimes given to the London borough of Southwark. Southwark, incorporated as a borough in the 13th century, was called "the" borough, just as London across the Thames was called "the" city.

Boroughbridge. Parish and market town in the W. Riding of Yorkshire, England. It stands on the Ure river, 11 m. N.E. of Harrogate, and on the Great North Road. Here Edward II defeated, March 16, 1322, the barons under his uncle, Earl Thomas of Lancaster. Near by are the Devil's Arrows, three monoliths erected before the Roman period. Market day, Mon. Pop. (1951) 1,847.

Borough Council. In England and Wales and Northern Ireland, the council of a municipal borough or of one of the 28 London metropolitan boroughs. Municipal borough councils are governed by the Local Government Act, 1933, metropolitan borough councils by the London Government Act, 1939. Both consist of (i) a mayor, elected annually by the council from among the aldermen or councillors; (ii) aldermen, to the number of one-third of the councillors, elected for six years by the councillors, one half retiring every third year; (iii) councillors, elected for three years by the electors of the borough. In municipal boroughs, one-third of the councillors retire every year and are replaced by a new election, in metropolitan boroughs, all the councillors retire together every third year.

Borough English. Custom by which land descended to the youngest, not to the eldest son, in the absence of specific provision to the contrary. It was so named

because it prevailed in certain English boroughs. It was abolished by an act of 1925.

Borovsk. A town of the R.S.F.S.R., 60 m. S.W. of Moscow. Founded in the 13th century, it was for a time the residence of princes of Borovsk, and suffered severely during the wars waged by one of the false princes Demetrius (*q.v.*).

Another Borovsk, created 1949 in the Urals, R.S.F.S.R., lies 120 m. N. of Molotov (more familiar as Perm). On the Kama river, it has ship-building yards, paper mills, and chemical works connected with local salt and potash mines.

Borromean Islands. Four islands in Lake Maggiore, N. Italy. They lie off the W. shore, between Stresa and Baveno, and belong to the Borromeo family. On Isola Bella, Count Vitaliano Borromeo built (1650-71) a splendid chateau, which he made his summer residence, laying out a beautiful terraced garden. Isola Madre (mother isle), the largest island, is laid out in a similar style, but with a luxuriant English garden; it also has a chateau. Isola dei Pescatori has a fishing village of some 300 souls, and Isolino S. Giovanni, a tiny island, lies off Pallanza.

Borromeo, CARLO (1538-84). Saint and archbishop of Milan. Born at Arona, Oct. 2, 1538, of



Carlo Borromeo,
Italian cardinal
From an old print

noble parentage, and the nephew of Pope Pius IV, he studied at Milan and Pavia, and obtained a doctor's degree in law in 1559. In 1560, having been made cardinal and secretary of state at Rome, he worked for the reopening of the Council of Trent, which reassembled in 1562 largely as the result of his efforts. In 1563 he was ordained priest, and in 1564 consecrated archbishop of Milan.

Borromeo organized a series of reforms in his diocese, and in spite of considerable opposition secured improvements in ecclesiastical discipline and clerical morals, and in church music. He also promoted education for the young, and the beginning of Sunday schools dates from his efforts. During the plague at Milan, 1576-77, his ministrations were incessant and fearless. He died at Milan, Nov. 3, 1584, and was canonised in 1610. His festival is Nov. 4. *Consult Life*, G. P. Giussano, Eng. trans. 1884.

Borromeo, FEDERIGO (1564-1631). Archbishop of Milan. Cousin of Carlo Borromeo, he studied at Bologna and Pavia, and became cardinal in 1587 and archbishop of Milan in 1595. He was conspicuous in the organization of relief for the people of Milan during the famine of 1627-28, and was the founder of the Ambrosian library.

Borrow, GEORGE HENRY (1803-81). British author and traveller. Born at Dumpling Green, near



George Borrow,
British author
T. Phillips, R.A.

East Dereham, Norfolk, July 5, 1803, son of Captain Thomas Borrow, adjutant of the East Norfolk Regiment, he was of Cornish descent on his father's side and on his mother's of Huguenot ancestry. During a wandering boyhood, moving with his father's regiment, he received a somewhat fragmentary education at Norwich grammar school and Edinburgh high school. Having developed a passion for outdoor life, he got into touch with the gipsies and began philological studies which led to his mastery of more than thirty languages.

Articled to William Simpson, solicitor, Norwich, 1819-24, he came under the influence of William Taylor of that city, and on coming to London after his father's death in 1824, received £50 from the publisher, Richard Phillips, for writing the records of some 400 celebrated trials. He then spent several years in wandering about in gipsy fashion, doing occasional work for publishers, and in 1832 was introduced by the Rev. Francis Cunningham to the Bible Society, of which he became a travelling agent. In this capacity he visited St. Petersburg, 1833-35, and lived for six years in the byways of Spain, suffering great hardships and an imprisonment which nearly caused a rupture between Britain and Spain; he also travelled in Portugal and Morocco. Returning to England in 1840, he married and settled down at Oulton, near Lowestoft. After visiting S.E. Europe in 1844 and Wales in 1854, he lived in Hereford Square, London. In 1874 he returned to Oulton and died there, July 26, 1881.

During his lifetime Borrow achieved one great success in the popularity of his Bible in Spain; or, Journeys, Adventures, and Im-

prisonments of an Englishman in an attempt to circulate the Scriptures in the Peninsula, 1843. Otherwise, apart from the tributes of Mrs. Hemans, Mrs. Browning, Charlotte Brontë, and Dr. Hake, the world passed him by, until Watts-Dunton, in *The Athenæum*, in 1881, drew attention to his genius. Borrow gave new life to the study of gipsy lore, and his love of the open air—"the wind on the heath"—led to the formation of the caravan club, open road league, amateur camping club, and similar organizations. In 1913 the mayor of Norwich presented to that city the house in which Borrow once lodged, to serve as a museum.

Borrow's chief works, in addition to *The Bible in Spain*, were *The Zincali*, or *Gipsies of Spain*, 1841; *Lavengro* (word-master), 1851, and its sequel, *The Romany Rye*, 1857; *Wild Wales*, 1862. He also published *Romantic Ballads*, from the Danish, 1826; *Targum*, 1835; *Romano Lavo-Lil*, or *Word Book of the Gipsy Language*, 1874; and translated von Klinger's *Faustus*, 1825; Pushkin's *Talisman*, 1835; S. Luke's Gospel into the Gitano dialect, 1837; and edited a Basque translation of the last-named work, 1838. A man of superb mental and physical virility and a pronounced Protestant, he lived much apart and out of sympathy with society. He was whimsical, eccentric, lovable, sensitive, and a whole-hearted hater of shams, a *Gil Blas* with a touch of Bunyan, whose association with vagabonds, horse-dealers and prize-fighters, while it did not lower his own character, was the cause of prejudice against him.

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Borrowdale. Parish of W. Cumberland, England. It is 5 m. S. of Keswick, and lies above Derwentwater, in the beautiful valley of the Derwent. Once famous for its black lead mines, it contains the curiously poised Bowder Stone. Pop. (1951) 724.

Borrowstounness OR BO'NESS. Police burgh and seaport of West Lothian county, Scotland. It stands on the Firth of Forth, 24 m. by railway W.N.W. of Edinburgh. The chief industries are coal-

mining, iron founding, engineering, joinery, shipbreaking, pottery, and chemical manure works. It has a good harbour with wet dock (7½ acres), and carries on a brisk coasting trade. Here, in one of the now exhausted collieries, James Watt tested his first steam engine. Traces of the Antonine Wall exist at Graham's Dyke; at Kinneil House, now an ancient monument, Dugald Stewart spent his later life. Pop. (1951) 9,950.

Borsippa. Greek form of the name of the ancient Babylonian city of Barsip or Barziba which occupied the site of the modern mound Birs Nimrud; it lay on the Hindiya canal, 15 m. S.W. of Babylon. Excavations by Rawlinson, 1854, and Oppert, Rassam, 1879-80, and Koldewey, 1902, revealed the general layout of the city, with Ezida, the temple of Nabu, in its midst. The city was traversed by a processional way and surrounded by a battlemented wall. The core of the ziggurat, or temple tower, is the highest ruin in Iraq and was long thought to be the original Tower of Babel. A great fire which destroyed the temple partly vitrified the brick.

Borstal System. Method of dealing with the juvenile-adult offender—the youth from 16 to 21 years of age. Experiments in the penal treatment of youths having been carried on at the old convict prison at Borstal, near Chatham, in the early 20th century, the Borstal system was established by the Prevention of Crimes Act, 1908, to provide suitable training for young offenders in conditions other than those of a prison. The Criminal Justice Act, 1948, confirmed the principles and introduced modifications of practice.

Under the later Act a person between 16 and 21 may be sentenced to Borstal training if convicted of any offence punishable with imprisonment, and if the court, having regard to character and conduct, thinks this an appropriate sentence. The court does not specify the period of detention, but the Act fixes a maximum of three years and a minimum, except under special direction of the home secretary, of nine months. Detention is followed by supervised freedom until four years have passed from the date of sentence.

Training, directed to the development of character and capacities, is based on progressive trust involving personal decision, responsibility and self-control. Besides interesting work, physical

training, evening classes, and a reasonable time for recreation, provision is made for continued education by class teaching, and individual study is encouraged. The Borstal division of the Central After-Care Association maintains contact with every inmate throughout his training. This association tries to find suitable employment for each person on release, and arranges through its agents, usually probation officers, for supervision, assistance, and advice. Two out of three Borstal boys do not, in any serious sense, revert to crime; the record for girls is slightly better. See *Prison* and *Prison Reform*.

Borszék. Watering place of Transylvania, Rumania. Situated in the Carpathian Mts., 60 m. N.E. of Maros-Vasárhely, it has springs and its waters are exported.

Bort, Boort, or Boarr. Trade name for a diamond too badly flawed or too off-colour to be used as a gemstone, but of great importance because of its extreme hardness as an abrasive in industry. It is also used in cutting tools and drilling bits. Bort is a by-product of all diamond mining and forms 50 p.c. of the average year's production. See *Diamond*.

Borthwick Castle. Ruined peel tower in Midlothian, Scotland, 13 m. S.E. of Edinburgh. Built about 1430, it housed Mary Queen of Scots in 1567. In 1650 it capitulated to Cromwell.

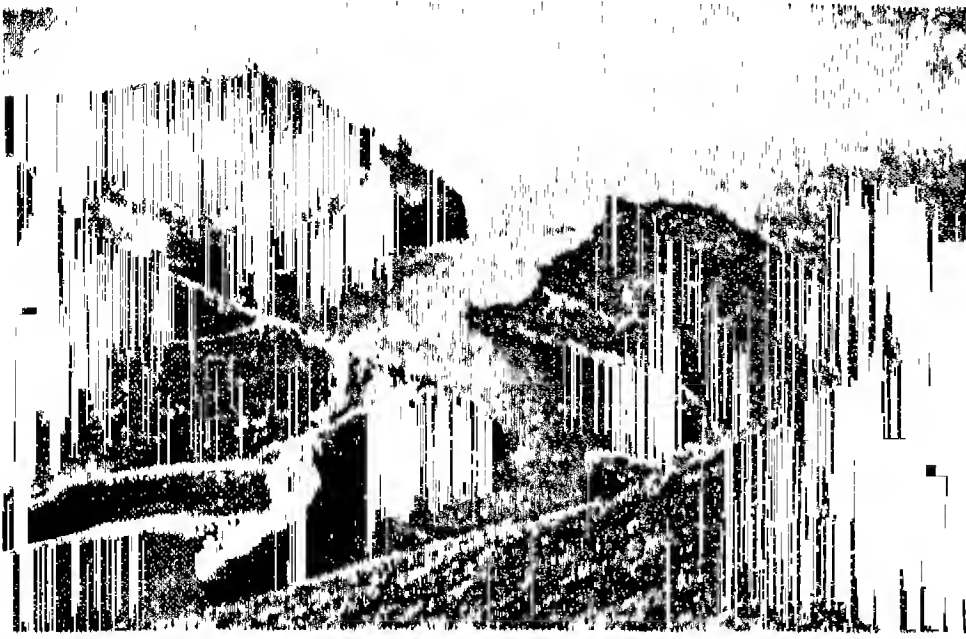
Boryslaw. Polish form of the name Borislav (*q.v.*), a town of Ukraine S.S.R.

Borzoï (Russian, swift). Hound that hunts by sight. Used in Russia, the country of its origin, to hunt wolves, it was first seen at an English show in 1871, and quickly



Borzoï. Hound of Russian origin that hunts by sight

attracted admirers. Its proportions are elegant and graceful, its head long and narrow, and its long silky coat is white, with fawn, brindle, grey, or blue markings; it is docile in character. A borzoï dog stands 29 ins. or more at the shoulder, a bitch 27 ins. or more.



Boscastle. The entry to the harbour which, with 61 acres of adjoining cliffs, became National Trust property in 1956

Boscastle (anc. Botreaux Castle). Seaside village of Cornwall, England, 6 m. N. of Camelford. The tiny intricate harbour is famous, as is the cliff scenery. At St. Juliot's, 2½ m. E., Thomas Hardy was employed as architect to restore the church, and utilised his experience and the district in his novel, *A Pair of Blue Eyes*, 1873.

Boscawen, Edward (1711-61). British admiral nicknamed Old Dreadnought by his sailors: as commander-in-chief at Portsmouth he signed the order for the execution of Admiral Byng, 1757. Born in Cornwall, Aug. 19, 1711, a son of Hugh, 1st Viscount Falmouth, Boscawen entered the navy in 1726. He took part in Anson's victory over the French, May 3, 1747, off Cape Finisterre. In 1751 he was made a lord commissioner of the Admiralty. He was c.-in-c. at the fall of Louisbourg on Cape Breton Island in 1758. Boscawen commanded the Mediterranean squadron in 1759, defeated the French fleet off Gibraltar, Aug. 18, and pursued and destroyed the remnant of the enemy ships in Lagos Bay, after which victory he was made general of marines with a salary of £3,000 a year. He died Jan. 10, 1761.

Bosch, Hieronymus or Jerom. Name adopted, from his birthplace, 's Hertogenbosch, by Jerom von Aeken (c. 1460-1518), Flemish painter. His subject matter—*diableries* such as Brueghel loved to paint—has been of the greatest interest to painters. For many years he was considered macabre and critics declared his spectres, devils, and other fantasies merely grotesque. Later opinion, however, has modified this judgement, and his eccentricity in painting has been the subject of several analyses dealing with the subconscious in art. He is represented in galleries at Berlin, Munich, Madrid, Brussels, and Antwerp.

Boscobel (pretty wood). Parish of Shropshire, England, 6 m. N.E. of Shifnal. Its manor house was a hiding place of Charles II after his defeat at Worcester, on Sept. 3, 1651. The famous Royal Oak in which he sat is dead. Boscobel House is in the neighbourhood. Pop. (1951) 20.

Boscombe. Eastern suburb of Bournemouth, Hants, England. It has a fine pier, and is noted for its chine and pleasure gardens.

Boscombe Down, near Amesbury in Wiltshire, is the site of an important aircraft and armament experimental establishment.

Bose, Sir Jagadis Chandra (1858-1937). Indian scientist who founded the Bose Research Institution at Calcutta. He was born Nov. 30, 1858, and educated in Calcutta and at Christ's College, Cambridge. In 1919 he announced his discovery of a method of anaesthetising trees in order to transplant them without injury, and of increasing their rate of growth by stimulation. He invented the crescograph, with which it is possible to record the life-growth of plants. Knighted in 1917, he died Nov. 23, 1937.

Bose, Subhas Chandra (1897-1945). Indian politician. Educated in India and at Cambridge University, he was a member of Bengal legislative council 1926-29. President of Bengal National Congress 1927-31, he was expelled from the party for his extremist views. He was president of the Indian National Congress, 1939. In July, 1940, Bose was arrested for threatening to destroy the memorial to the Black Hole of Calcutta. He escaped to Axis territory, and was reported to have seen Hitler and visited Tokyo. On Oct. 21, 1943, he became the leader of a Japanese sponsored "provisional government of Free India." Bose died Aug. 19, 1945, after an air crash on Formosa.

Bosna. River of Yugoslavia, a tributary of the Sava, which it joins near Samac.

Bosnia-Herzegovina. One of the six federal republics forming Yugoslavia under the constitution of 1946. It lies in the N.W. of the Balkan peninsula, bounded on the

E. by the r. Drina, on the S. by Montenegro, on the W. by the Dinaric Alps, and on the N. by the r. Sava (Save). The republic consists of the two provinces of Bosnia and Herzegovina, which have separate but linked histories, and were formed into an administrative unit when Austria annexed them in 1908. Area 19,206 sq. m. Pop. (1953) 2,843,486.

Nearly half the population are Orthodox Serbs, but most of the Muslims of Yugoslavia are concentrated in Bosnia-Herzegovina and form the second largest group; there is a substantial minority of R.Cs.

The republic is a wild and mountainous region, with thick forests to the E.; it is broken by fertile valleys and highland hollows, and there are plains along the Sava and its tributaries. The main rivers are the Vrbas, Bosna, Drina, and Neretva.

The main agricultural products are tobacco, wheat, barley, maize, and immense crops of fruit, much of which is dried for export. Timber is produced in the E. Many of the peasant proprietors of small farms engage in cattle grazing, sheep farming, and pig breeding, with an attendant trade in hides, skins, and wool.

Coal, iron, copper, manganese, bauxite, chromium, and quicksilver are found, and Bosnia is the main industrial region of Yugoslavia. The Jabanjta dam and hydro-electric station on the Neretva river between Mostar and Konjic, constructed after the Second Great War, supplies power. Some 400 m. of railway were built during 1945-54. Zenica, near Travnik, is the centre of the Yugoslav steel industry.

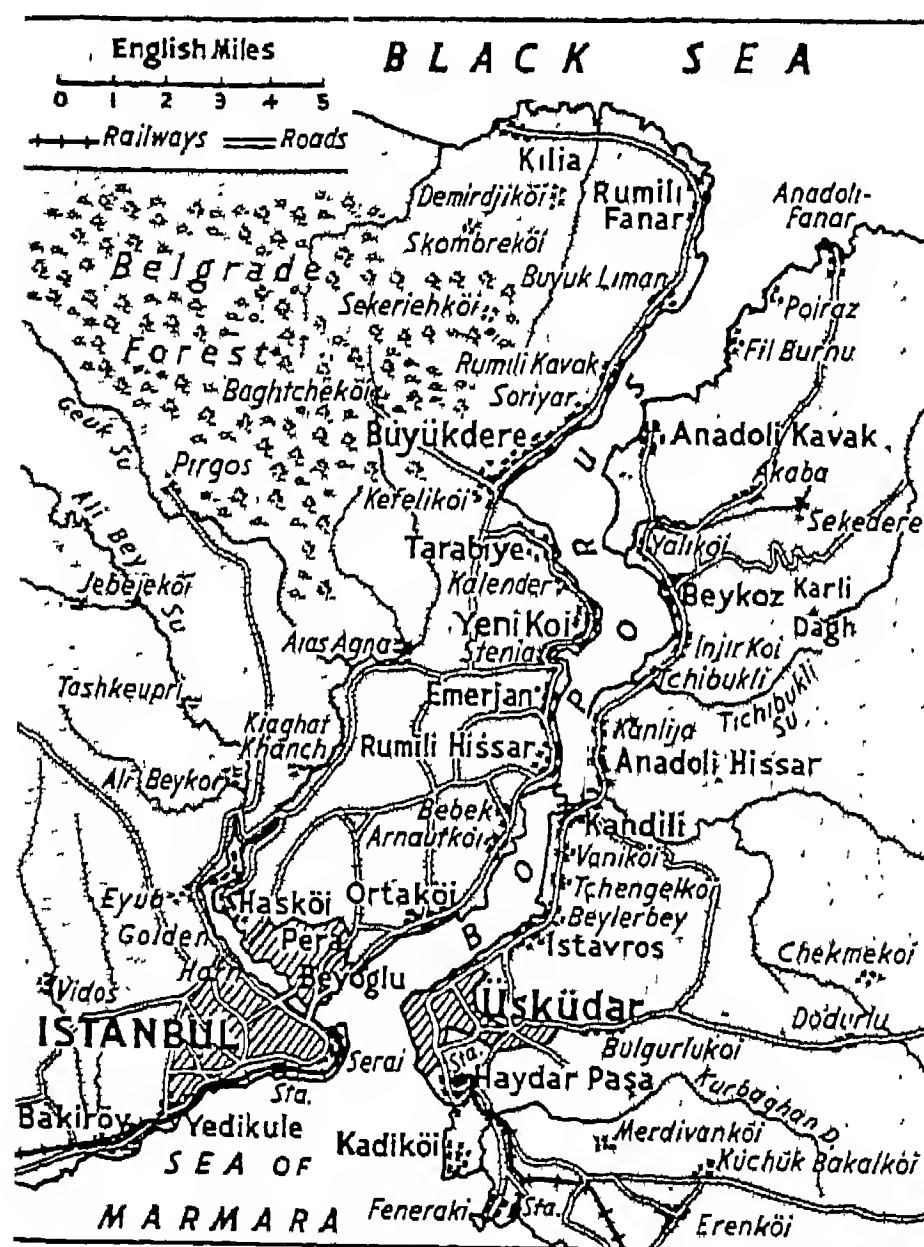
The chief towns are Serajevo, the capital, Banjaluka, and Mostar.

HISTORY. Under the Romans both Bosnia and Herzegovina were part of Illyria; they developed as separate entities after the area was overrun by the Slavs in the 7th century. At different times they came under the control of the Croats, the Hungarians, the Serbs, and the Bulgars, and in the 14th century Bosnia reached its highest point as an independent kingdom under Stephen Tvrtko. They came under Ottoman control in 1528. In both provinces many Slavs accepted Islam.

After 350 years of Turkish rule, the Christian serfs rose in 1878; and the Congress of Berlin, 1878, handed over the dual province to Austrian administration while leaving it nominally under Turkish

suzerainty. Austria annexed it in 1908; and in 1918 the area became part of the new kingdom of the Serbs, Croats, and Slovenes (later Yugoslavia). During the Second Great War Bosnia was the main battlefield between the Yugoslav partisans and the Axis occupying forces; and the first substantial stretch of Yugoslav territory liberated was in Bosnia.

Bosporus or **BOSPHORUS** (Turk. *Bogaziçi*). Narrow channel, running in a general N.E. to S.W. direction, connecting the Black Sea with the Sea of Marmara and separating Europe from Asia Minor. It is 16 m. long and varies in width from $\frac{1}{2}$ m. to 2 m. On its W. side it opens out into seven bays, one of which forms the harbour of Istanbul.



Bosporus. Map of the channel separating Europe from Asia Minor, and the only exit from the Black Sea

bul and the Golden Horn. Its shores, which rise in places to 330 ft., are studded with villas and holiday resorts. A strong current flows through the strait from the Black Sea to the Sea of Marmara. The word Bosporus means ox ford.

Bosruck. A tunnel in the Austrian Alps, on the rly. between Klaus and Leitzen. It was opened in 1905, is 3 m. long, and 2,380 ft. at its highest point.

Boss (Fr. *bosse*, hump). Word with three principal meanings. (1) In architecture, the carved stone or piece of wood placed as an ornamental key at the intersection of the ribs of a vault or flat roof.

When the old nave of Southwark cathedral collapsed, about 1838, a number of bosses were taken from the oak vault, presenting a great variety of heraldic and grotesque designs. A remarkable stone boss, carved with the helm and crest of Sir John Crosby, was saved from Crosby Hall. The carvings on most bosses are generally of conventional foliage.

(2) In geology, a mass of intrusive igneous rock. It is more or less cylindrical in form, with sides approaching the vertical. (3) In engineering and aeronautics, the hub or central metal fitting. It allows the propeller or airscrew to be secured to the propeller shaft driven by the engine. The central part of the propeller itself is also referred to as the boss.

Boss (Dutch *baas*, master). An American word, now in general use in the sense of a master, employer of labour, or one in charge of labour. It was thus used by John Galt in 1830. The Americans also use it for the director of a political organization, e.g. Boss Croker of Tammany Hall.

Bossi Work. System of inlaying marble, by chiselling designs and filling up the cavities with tinted marbles, jasper, or scagliola. Some of this work was carried out under

the Adam brothers, but most was produced in Dublin—it was said by an Italian named Bossi, who used a secret process. The designs are usually delicate floral and geometrical patterns.

Bossom, SIR ALFRED CHARLES (b. 1881). British architect and politician. Born in London Oct. 16, 1881, he went to the U.S.A. in 1903 and designed prominent buildings, e.g. Magnolia Petroleum Co. building (Dallas, Tex.); Seaboard National Bank (New York); Liberty Bank (Buffalo, N.Y.). He founded the Alfred C. Bossom travelling scholarship, awarded annually by the R.I.B.A., and the

Bossom building research lectures given under the Chadwick trust. He was a member of the British building mission to the U.S.A., 1943. From 1931 he represented Maidstone as Conservative M.P. He was created a baronet in 1953. His publications include *Building to the Skies*; *A Bird's Eye View of Europe*; *Post-War Building*.

Bossuet, JACQUES - BÉNIGNE (1627-1704). French bishop whose magnificent oratory permanently



J.-B. Bossuet, French bishop After H. Rigaud

influenced French and English preaching. Born at Dijon, Sept. 27, 1627, the son of a judge, he was educated at the Jesuit college at Dijon, and in Paris. From the age of eight he

was destined for the priesthood, and in 1652 he was ordained and became a doctor of divinity. In the same year he was appointed archdeacon of Metz, where there was a strong Protestant party, and Bossuet began to develop the gift for preaching that he had displayed when still at school. He returned to Paris in 1659, soon becoming famous throughout France as an outstanding orator and defender of Roman Catholicism. Notable among his funeral orations, which were models of religious rhetoric, were those on the death of Henrietta Maria, 1669, of her daughter Henrietta, 1670, and of Condé, 1687.

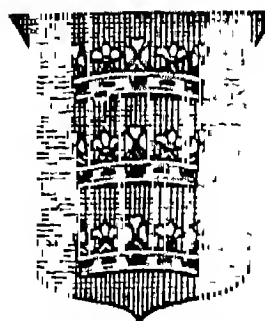
In 1669 Louis XIV appointed Bossuet bishop of Condom and a year later tutor to the dauphin, a post he held for ten years. He translated and wrote many textbooks for his pupil, including his *Discours sur l'Histoire Universelle* (discourse on universal history), published 1681.

Bossuet was elected to the French Academy in 1680, appointed bishop of Meaux 1681, and made a councillor of state 1697. In his *Exposition de la doctrine Catholique* (explanation of Catholic doctrine), 1671, and numerous other works, he defended Roman Catholicism and the Gallican Church, and tried to re-establish the unity of the Church. In his last years he fiercely attacked the quietist doctrine of Fénelon. He died in Paris, April 12, 1704. Consult *A Study of Bossuet*, W. J. S. Simpson, 1937.

Boston. Name given to a twin-engined medium bomber supplied to the R.A.F. early in the

Second Great War. It was made by Douglas Aircraft Co. of California, U.S.A. The crew consisted of a pilot, navigator/bomb-aimer, and a radio operator who also served as a rear gunner. The wing span was 61 ft. 4 in. and the length 47 ft. 3 in. It was armed with six machine-guns. The Boston could carry 1,000 lb. of bombs. The combined h.p. of the two Wright radial engines was 3,200 and the top speed was just over 290 m.p.h. *See also Havoc.*

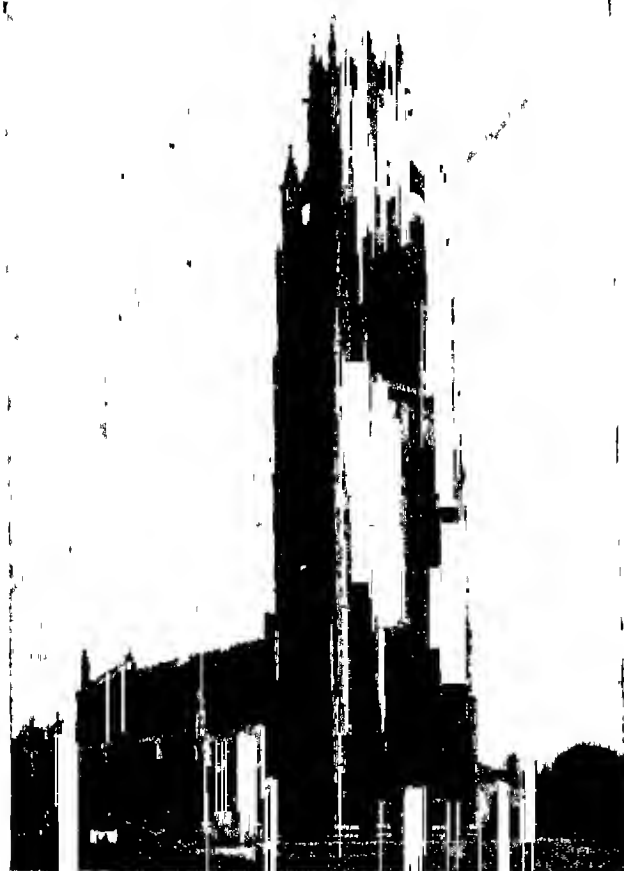
Boston. Mun. bor. and seaport of Lincolnshire, England. It lies on the Witham, 5 m. above its



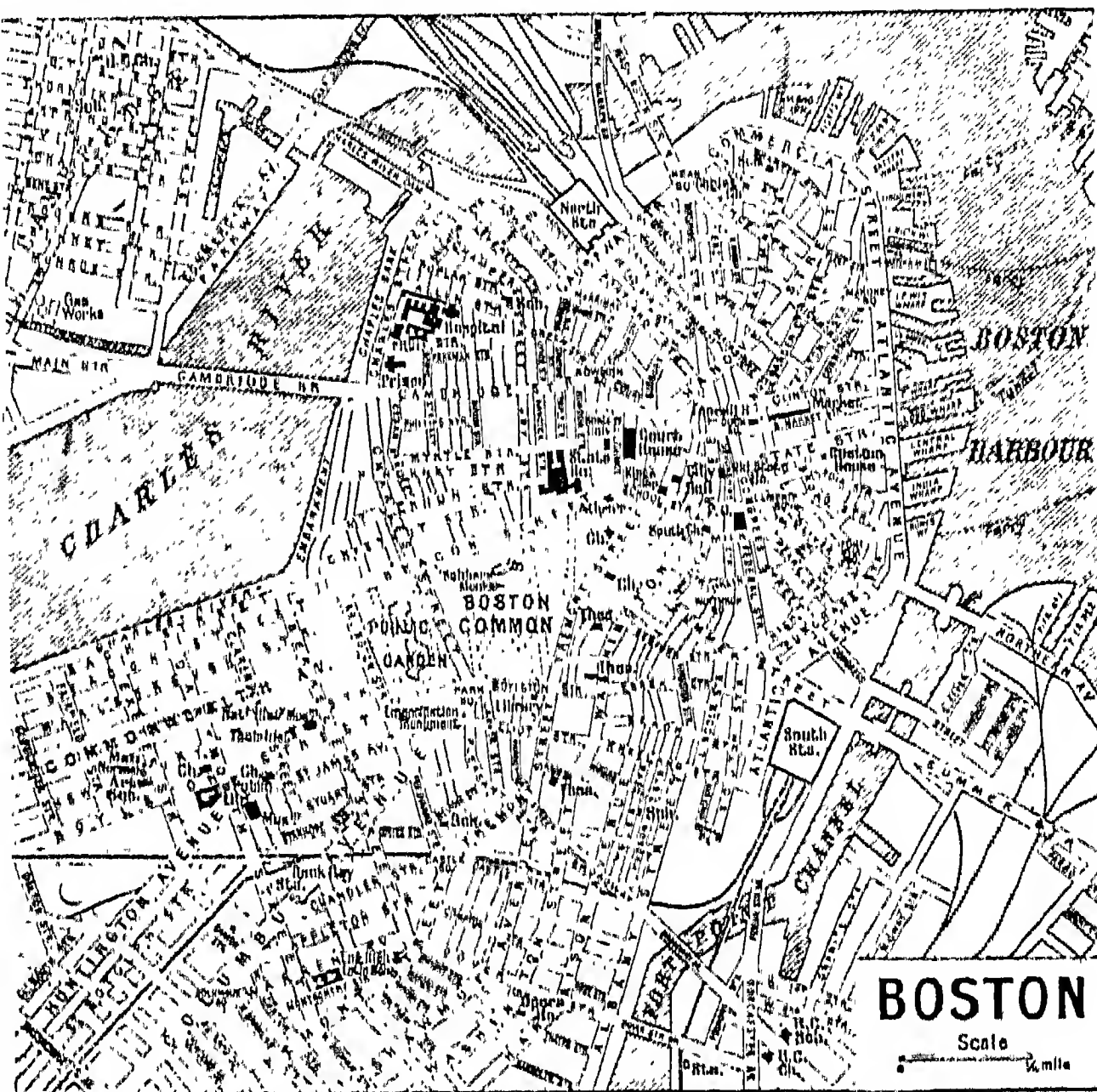
Arms of Boston,
Lincolshire.

entrance to the Wash and 107 m. N. of London on the railway. Boston is said to be a contraction of Botolph's town, S. Botolph having founded a monastery here in 654. By the end of the 13th century it was a leading port of the country, and in 1545 was incorporated by Henry VIII as a borough. During the 17th century expeditions from Boston led to the founding of Boston, Mass.

The church of S. Botolph, Decorated and Perpendicular, is the largest parish church in the U.K., its famous tower (Boston Stump) being a landmark. The corporation owns the dock, 1882, and a riverside quay, 1938, where vessels up to 3,000 tons can be accommodated. Principal cargoes are timber, grain, feeding stuffs, fertilisers, fruit, vegetables, and coal. Industries include flour-milling. A stock market is held



Boston, Lincolnshire. Church of S. Botolph, the high tower of which is known as Boston Stump



Boston, Mass. Plan of the city, showing principal buildings and harbour

on Wed. and a general market on Wed. and Sat. There were two M.P.s until 1885, one until 1918, when it was joined with Holland to form a div. (now a co. constituency). John Foxe, John Conington, and Jean Ingelow were natives. Pop. (1951) 24,453.

Boston. Capital of Massachusetts, U.S.A. Largest city of New England, and among the largest in the Union, it stands on Boston harbour at the head of Massachusetts bay. Chiefly by the incorporation of adjacent districts—S. Boston, Roxburgh, Dorchester, Charlestown, Brighton, Hyde Park, etc.—and partly by reclamation, the city grew to cover 66 sq. m. Pop. (1950) 801,444.

Boston, once called the "hub of the universe" because of the self-complacency of its people over the city's commercial and intellectual eminence, is still the hub of New England. It is the main terminus of several rlys. and its municipal airport and seaplane base are the most important in New England. The chief port of the New World in colonial days, it was tenth (1949) in the country by volume of commerce. It is the first wool market of the U.S.A. The harbour, constantly improved, is one of the great natural harbours of the country.

Historically, Boston is famous as the birthplace of the American

struggle for independence which culminated in the federal union of the thirteen original states. Here many of the leaders of the revolution lived and gave intellectual impetus to the struggle and here many of the great military and political events occurred.

Boston stands on a peninsula once known as Shawmut. The city, originally called Trimontaine, was first settled in 1630 by Puritan members of the Massachusetts Bay Co. under charter from Charles I. It was renamed after Boston in Lincolnshire, whence many of its early settlers migrated. It played a conspicuous part in the events which culminated in the Boston Massacre of 1770, and when, on Dec. 16, 1773, 340 chests of tea were cast into the harbour, the port was closed, and a British military force lodged in the city.

Among buildings of historical interest are Faneuil Hall (1742), or the "cradle of liberty," formerly the meeting house of revolutionaries; the Old South church or meeting house (1729), the scene of the protest meeting which preceded the Boston Tea Party (*v.i.*); the Old North church or Christ Church (1723), from whose spire were suspended the signal lanterns for Paul Revere; the Old State House, built in 1713 and since restored, now housing a



Boston, Mass. 1. The old State House, built in 1713. 2. Park Street and the new State House. 3. Beacon Street. 4. Old South Church or meeting house, built 1729

collection of relics and paintings; King's Chapel (1749), the first episcopal church in New England; and the new State House, erected in 1795, on Beacon Hill.

Of the modern structures may be mentioned the city hall, in Italian Renaissance style, behind which is the city hall annexe; the handsome county court house in granite; and the municipal library, 1888-95, a pile in the Italian Renaissance style, containing upwards of 1,000,000 volumes, including a magnificent Shakespearean collection and documents of American history. Other notable buildings are the old museum of fine arts, a neo-Classic example in granite, and the new Old South church, Italian Gothic, with a fine campanile.

Boston has long enjoyed a reputation as a seat of learning and a centre of literature, science, and art. From the first, its people cultivated the intellectual virtues under the Puritan regime. Some of the greatest figures in American literature, such as Emerson, O. W. Holmes, Hawthorne, Lowell, Longfellow, Whittier, lived and wrote in Boston or its environs. The social aristocrats of Beacon Hill today are the direct descendants of the original settlers. Their aloofness is epitomised in the well-known verse which celebrates Boston as "the land of the bean and the cod, where Lowells speak

only to Cabots and Cabots speak only to God." Sociologically, Boston is, perhaps, the most striking example of this phenomenon peculiar to American cities. Arising from it is a political one—the conflict between the polygot, predominantly working class populations of the chief cities, and the rural or "aristocratic" populations. The result has traditionally been the triumph of the democratic party "machine" in the cities, and of the republican party "machine" in the state.

Among higher educational institutions are the Massachusetts Institute of Technology, Boston University (Methodist Episcopal), Boston College (R.C.), founded 1863, the Massachusetts College of Pharmacy, the dental and medical schools of Harvard University, across the Charles river at Cambridge; Tufts College Medical School, and Massachusetts Normal Art School. In addition there are the Lowell Institute, founded 1839, supplying an annual course of free lectures on various subjects, the Boston Public Latin School (1635, the oldest in existence), and the English high school.

The city is well supplied with benevolent institutions, the more important of these being the Massachusetts general hospital, the Massachusetts homoeopathic hospital, and the city hospital. Besides the municipal library pre-

viously mentioned, collections are maintained by the American Academy of Arts and Sciences, the Massachusetts Historical Society, the Boston Athenaeum, and the New England Historic Genealogical Society. Boston symphony orchestra was founded in 1801.

The Common, 48 acres, a traditional forum of free speech, was set aside by Governor Winthrop in 1634 as a pasture and troop training field; adjoining it are public gardens, 24 acres, within which are statues of Washington and others. There are in all some 3,574 acres of parks within the city.

The exports of provisions, leather, textiles, wood products, and other goods are extensive. Manufactures include boots, shoes, organs, pianos, clothing, confectionery and bakery products, rubber products, chemical and electrical equipment. Other establishments include foundries and machine shops, sugar refineries, meat packing plants, and binderies and printeries. The harbour covers 47 sq. m. and the waterfront extends 40 m. The city's excellent water supply is brought by aqueduct from a gigantic reservoir on the Nashua river.

The Boston Transcript and the Boston Globe are newspapers read throughout New England; while the Christian Science Monitor has a world-wide reputation; the Christian Science church in Boston is the mother church of this sect.

Boston, THOMAS (1677-1732). Scottish churchman. Born at Duns, Berwickshire, of Covenanter parents, and educated at Edinburgh, he was appointed minister at Simprin in 1699, and eight years later was transferred to Ettrick, where he remained until his death. By republishing Fisher's Marrow of Modern Divinity, and by his own works, notably *The Crook in the Lot*, Boston greatly influenced Scottish Presbyterianism in the direction of Calvinism.

Boston Tea Party. Name given to disturbances in Boston, Mass., Dec. 16, 1773. They arose out of the attempt on the part of the British government to levy a tax of 3d. per lb. on tea. A party disguised as Red Indians boarded the ships which contained the tea and threw it overboard.

Boston Terrier. Breed of dog that originated in America from two British breeds, the bulldog and the bull terrier; it has also probably a trace of French bulldog blood. Bostons are affectionate,

gay, and faithful. Small to medium in size, they are compactly built; the smartly pricked ears, with short, wide, deep muzzle, give the characteristic head. The short glossy coat is brindle, with symmetrical white markings.



Boston Terrier. A breed of American origin

Boswell, SIR ALEXANDER (1775-1822). British antiquary and poet, eldest son of James (*v.i.*). He was born at Auchinleck, Ayrshire, Oct. 9, 1775. In 1803 he published *Songs Chiefly in the Scottish Dialect*; and at his private printing press, set up 1815 at Auchinleck, reprinted many old poems. M.P. for Plympton, 1816-21, in 1821 he was created baronet for composing the song "Long Live George the Fourth." He died at Balmuto, March 27, 1822, from a wound received in a duel with James Stuart of Duncarn.

Boswell, JAMES (1740-95). Biographer of Johnson. Born in Edinburgh, Oct. 29, 1740, he was the eldest son of Alexander Boswell, who took the title of Lord Auchinleck (*pron. Affleck*) on becoming a Scottish judge. Educated at Edinburgh and Glasgow universities, in 1760 he made his first acquaintance with London, and on a subsequent visit in 1762-63 he succeeded in obtaining an introduction to Samuel Johnson, who, notwithstanding his scorn for Scotsmen, fell under Boswell's charm.

Boswell, having resolved to write Johnson's *Life*, set about the task with a thoroughness and persistence excelled by no other biographer. Although his legal studies and family ties made it impossible for him to reside permanently in London, he frequented the metropolis at every opportunity, spent much of his time in Johnson's company, and kept a faithful record of the great man's conversation and habits. Boswell visited the Continent in 1763-64, and, after reading law at Utrecht, travelled to Italy. He met several celebrities, including Voltaire, Rousseau, Wilkes, and Paoli, the Corsican patriot, and

returning in 1766 was admitted an advocate at Edinburgh. In 1773 he persuaded Johnson to take a journey with him to the Hebrides. His account of his tour, published 1785, raised a storm of controversy, as did his *Life of Samuel Johnson*, 1791, owing to the frank-

ness with which they dealt with persons still living.

Boswell was first regarded as little more than a mere collector of Dr. Johnson's sayings; even Macaulay and Carlyle in their brilliant essays did him but scant justice. It has remained to critics of a later date, such as Jowett, Birkbeck Hill, and Leslie Stephen, to show that Boswell's masterpiece was a work of veritable genius. His own strong individuality became apparent when, in 1950, Yale University, which had bought Boswell's private papers in 1949, began publication of them (expected to run to 40 or more vols.) with his *London Journal* 1762-1763. Boswell, who was called to the English bar in 1786, in which year he had moved to London, was recorder of Carlisle, 1788-90. He died in London May 19, 1795, and was buried at Auchinleck. Consult also Boswell's *Letters to W. J. Temple*, 1908.

Bosworth, BATTLE OF. Fought between Richard III and Henry, earl of Richmond, Aug. 22, 1485. It resulted in the death of Richard and the accession of Henry to the throne as Henry VII. Henry landed in Wales and moved E. across England, gathering an army as he went, while Richard collected men around him in Leicester. On the 21st the two armies were close together near Market Bosworth, a village 12 m. W. of Leicester, while Lord Stanley with his vassals was equidistant from each and still undecided on which side to fight. On Ambion Hill, 2 m. S. of Bosworth, Richard drew up his army for battle.

Henry made the opening move. His men, the earl of Oxford leading the van and he himself the main body, skirted the marshes by the river and moved up the hill. The archers let fly, and then Richard's leading division charged, the king himself leading his bodyguard right into the enemy's ranks. Stanley decided the day. He fell

upon Richard's men from behind, and soon they were in flight, crying "Treason" as they ran. The king dashed into the fray again, but was unhorsed and battered to death. Stanley then crowned Henry as king. Richard's army of 7,000 or 8,000 men lost the duke of Norfolk and about 100 others; Henry's losses were also about 100 out of 5,000 engaged. This was the last encounter in the Wars of the Roses, which had lasted 30 years.

Botanic Garden. Garden designed for the study of plants as living things rather than for floral effects. Originally medicinal plants were the principal objects of study, and some of the gardens bore the name of Garden of Simples or Physic Garden, e.g. the institution at Chelsea, founded by the Apothecaries' Society about 1676. Nearly 200 years earlier Lord Zouche's physic garden at Hackney was in charge of the botanist L'Obel, who arranged his plants on much the same lines as are followed in the botanic gardens of today, so far as the botanical knowledge of the 16th century allowed.

Oxford's botanic garden was opened in 1621, Cambridge's in 1762; but in the latter part of the 16th century John Gerard had already laid a scheme for such a garden before Lord Burghley. The Edinburgh botanic garden had its origin in a 40 ft. square plot established by Sibbald and Balfour in 1667, and their success led to the making of a portion of Holyrood palace grounds into a royal physic garden. In 1776 the plants were transferred to a more favourable garden at Inverleith. The Dublin Society established Glasnevin botanic garden in 1795.

Kew, started as the private hobby of Princess Augusta, was in 1841 opened to the public; it was under the care of Sir W. J. Hooker, who with his son and successor, Sir Joseph Hooker, did much to make it a worthy national headquarters of botany. Trinity College, Dublin, established a botanic garden at Ball's Bridge in 1806; and the Sandyford botanic garden at Glasgow, opened in 1819, was transferred to Kelvinside in 1842. In 1839 the Royal Botanic Society leased part of Regent's Park, London, maintaining a garden there until 1932. The British Commonwealth has botanical outposts oversea, as at Sibpur, near Calcutta; Peradeniya, Ceylon; Singapore, off Malaya; Sydney, New South Wales; Trinidad; Georgetown, British Guiana; and Vancouver, B.C. Many of the

countries of Europe have their botanic gardens, among which may be mentioned the Jardin des Plantes at Paris, founded in 1626; and, in the tropics, the Jardin Botânico at Rio de Janeiro.

In well-equipped botanic gardens such as Kew, there are museums, herbaria, and laboratories, the last for investigation and research. Seeds and plants are received from abroad, and

material and advice sent to the oversea countries of the Commonwealth with a view to establishing suitable crops—e.g. tea, cotton, rubber. Through Kew the quinine-tree (cinchona) was introduced to India and Para rubber (*Ilex*) to the Malay Peninsula.

Mention must also be made of the beautiful trial grounds of the Royal Horticultural Society at Wisley, Surrey, opened 1904.

BOTANY: THE SCIENCE OF PLANT LIFE

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This article outlines the chief branches and uses of Botany. The different classes of plants and flowers, the plants and flowers themselves, also the leading botanists of the world, are dealt with under their own headings

Botany (Gr. *botanē*, plant) is the branch of biology concerned with the study of plants. Botanical lore of some sort must go back to the dawn of thinking man, for a knowledge of which plants were safe and palatable to eat and which should be avoided was essential to his life and well-being.

In historic times, the Greek philosopher Theophrastus (c. 372–288 B.C.), a pupil of Aristotle, is usually regarded as the “father of botany” since he was the first to study and comment on plant structure and to note characteristics which are still used in the identification of species. He was followed by the elder Pliny (A.D. 23–79), whose *Historia Naturalis* (natural history) contains descriptions of about a thousand plant species, and by Pliny’s contemporary Dioscorides, a physician in the Roman army who included a great deal of botanical information in his *Materia Medica*. These remained the chief authorities throughout the Middle Ages, and until the publication of the 16th-century herbals.

Doctrine of Signatures

The early German herbals took account for the first time of the difference in flora between the Mediterranean basin and the countries of northern Europe. Much of their information was based on peasant lore and local observation; but they were influenced also by the doctrine of signatures which supposed that plants were marked by God with an outward symbol of their medicinal properties. Thus a heart-shaped leaf would signify a plant valuable in treating cardiac disorders, and bright patches on the petals a plant suitable for application to the eyes.

The first English herbal was published by William Turner (d.

1568) in 1551; a later compilation by John Gerard (1545–1612), published in 1597, became the standard work of reference for English botanists in the 17th century. A herbal by Thomas Culpeper (1616–54), first published in 1649 and many times reprinted, claimed on its title page that it was “a complete Family Dispensatory.” An edition of 1814 “added upwards of one hundred additional herbs with a display of their Medicinal and Occult Qualities; physically applied to The Cure of All Disorders incident to mankind.” But the greatest of the earlier English botanists was John Ray (1627–1705), who produced the first scientific flora of Great Britain, and set a new standard of accuracy in botanical description and classification.

Ray’s work laid the foundation for the new departure in scientific classification inaugurated by Linnaeus (Carl von Linné) in *Species Plantarum*, published in 1753. For the cumbrous systems of his predecessors Linnaeus substituted an arrangement by which each plant is given a distinctive name consisting of two parts only: the name of the genus (which may be said to correspond with the surname) and the name of the species (equivalent to the personal name).

After Linnaeus

The actual classification which Linnaeus put forward has been superseded by later systems based on the work, 1862–83, of G. Bentham and W. J. Hooker in England and, 1888–1915, of A. Engler and K. Prantl in Germany. These differ from earlier systems by grouping plants according to their similarities, particularly in flower structure—a basis which gives rise to a natural classification closely in line with evolutionary

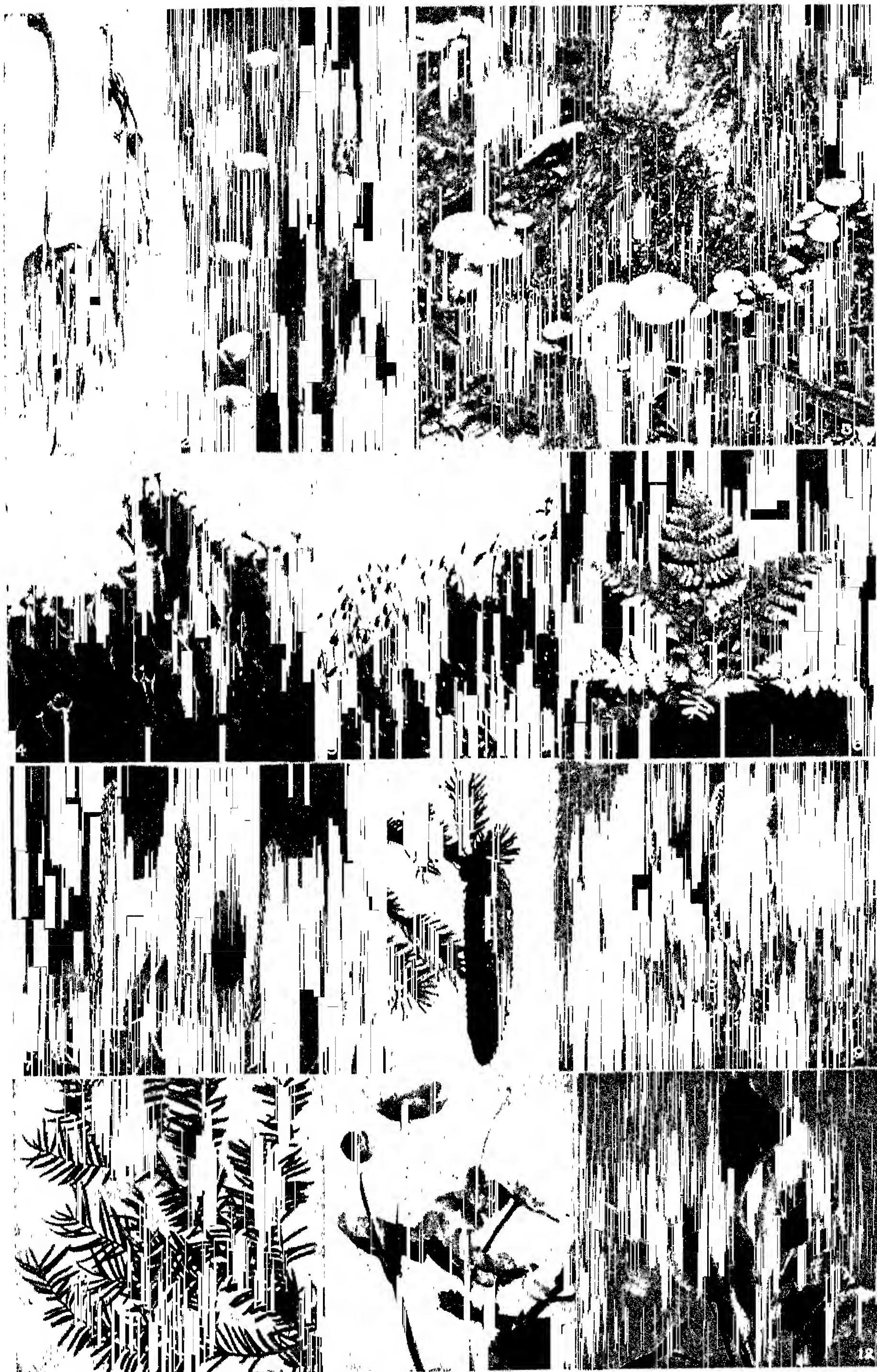
history. Artificial systems, which separate flowers according to their differences, are of use for identification only.

Parallel with the study of flowering plants there grew up an interest in lower forms of plant life such as algae and fungi and the microscopic forms first demonstrated by Leeuwenhoek (1632–1723). Leeuwenhoek did not bequeath to the world his jealously guarded secrets of lens manufacture, and for a long time after his death there was a scarcity of good optical instruments; but other workers began to improve available microscopes, and by the middle of the 19th century much knowledge had been amassed.

The 19th century as a whole showed a vast and comparatively rapid increase in scientific learning both in Great Britain and on the Continent. Pre-eminent among biologists was Charles Darwin (1809–82) who, in his famous book on *The Origin of Species*, published in 1859 after more than 20 years’ thought and research, propounded the theory which bears his name and which completely altered all previous speculation as to the origin of life. In contradiction to the then current view that each living organism was created once and for all at the same period in the earth’s history, i.e. special creation, Darwin stated that every living organism is descended from a simpler ancestor, the earlier giving rise to the later by a gradual process of modification and selection of such modifications by competition, i.e. the so-called “struggle for existence.” This theory of evolution gave rise to considerable controversy at the time but a century later had not been seriously challenged.

In 1900 the study of plants received a great impetus in the discovery of the records of the work of Gregor Johann Mendel (1822–84). In the garden of his monastery at Brünn he made a series of experiments in the hybridisation of plants, notably *Pisum sativum*, the edible pea. Although his work was published in 1866, it was ignored; after 1900 the significance of his laws of heredity came to be appreciated and very quickly revolutionised man’s control over the food plants—and animals—upon which his life depends.

Botany has so many aspects that every man may be in some sense a botanist. There is no doubt that the arresting beauty and profusion of the wild flowers—



1. *Laminaria digitata*, a kind of seaweed. 2. Slime fungus, *Craterium minutum*. 3. Sulphur Tuft toadstool, *Hypholoma fasciculare*. 4. Lichen, *Cladonia pyxidata*. 5. Moss, *Mnium hornum*. 6. Prickly shield fern, *Nephrodium spinulosum*. 7. Marsh club moss, *Lycopodium inundatum*. 8. Fir cone of the spruce, *Picea excelsa*. 9. Horsetail, *Equisetum arvense*. 10. Common yew, *Taxus baccata*. 11. Marsh marigold, *Caltha palustris*. 12. Wake robin or cuckoo pint, *Arum maculatum*.

BOTANY: REPRESENTATIVE PLANTS OF THE VEGETABLE KINGDOM

notably willow-herb or rosebay (*Epilobium angustifolium*)—which so quickly, even in central London, colonised the sites cleared by bombing from the air during the Second Great War proved a great stimulus to the interest in botany of many town dwellers to whom it had been a closed book.

Main Plant Groups

The plant kingdom with which botany is concerned includes organisms of very diverse kinds and may be conveniently divided into seven main groups:

1. **ANGIOSPERMS** or flowering plants. These may be herbs, trees, or shrubs and all bear flowers and later seeds. The angiosperms are the most highly evolved group of plants.

2. **GYMNOSPERMS**. These are seed bearing trees characterised by the fact that the ovule (and later the seed) is borne naked and is not protected in an ovary as in a flowering plant. The most important group of gymnosperms at the present time is that of the conifers or cone-bearing trees, *e.g.* the pines (*Pinus* spp.) and spruces (*Picea* spp.). Many gymnosperms are known only as fossils and are of great botanical interest.

3. **PTERIDOPHYTES**. These include the ferns (Filicales), the horsetails (Equisetales), and the clubmosses (Lycopodiales). They are primitive land plants which exhibit Alternation of Generations (*q.v.*) and which are dependent upon free water for sexual production.

4. **BRYOPHYTES**. This includes all the mosses (Musci) and the liverworts (Hepaticae).

5. **ALGAE**, a vast assemblage of primitive plants which range in size from the microscopic (*e.g.* *Chlamydomonas*) to the enormous brown seaweeds. Most of the algae are aquatic but some will grow in any damp situation.

6. **FUNGI**. This group of organisms, with the bacteria, differ from the rest of the plant kingdom by not possessing the green colouring matter chlorophyll and so are unable to build up carbohydrates from carbon dioxide and water by photosynthesis. Fungi feed either parasitically on living organisms or else saprophytically on dead organic matter.

7. **BACTERIA**. These are generally considered to belong

to the plant kingdom. They are of great economic importance and a whole science, bacteriology, is devoted to their study. Some bacteria are pathogenic, producing diseases in human beings and animals. Some live in the soil and play an important part in influencing soil fertility.

The science of botany is divided into a number of different fields, some of which have developed so much and become so specialised as almost to form separate sciences. The study of the form of a plant is called morphology and includes anatomy, the study of its structure; histology, the study of its tissues; and cytology, the study of the details of cell structure. Physiology is concerned with the functioning of the plant, and deals with such fundamental biological matters as growth and respiration (both of which are characteristics of all living organisms), with water and salt uptake, and with photosynthesis. Taxonomy is concerned with the naming and classification of plants and has obvious links with plant geography, which is the study of plant distribution.

One of the most fascinating aspects of botany is ecology—the study of plants in relation to their environment. Ecology combines both laboratory and field work and is the meeting point of many branches of the subject. Some geneticists are interested primarily in plants, and plant genetics and plant breeding have important economic aspects. Fossil botany, plant chemistry, and microbiology are other aspects of the science of plant life.

Botanical Research

In the U.K. botanical research is carried out in departments of botany in all universities and in many research institutes maintained by the state or by private interests. These institutes are usually concerned with some specialised aspect of the subject, since botany has much to contribute to the studies of agriculture, forestry, and wood technology. The study of plants is of vital importance to the health and well-being of the peoples of the earth, and realization of this has given to botany a steadily growing importance among the sciences.

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the Living Plant, F. O. Bower, 1950; Flora of the British Isles, Clapham, Tutin, & Warburg, 1952; Plant Form and Function, Fritsch and Salisbury, 1953; Popular Book of Botany, ed. J. Ramsbottom, 1953.

Botany Bay. Shallow inlet, one to three miles wide, on the E. coast of New South Wales, Australia, five miles S. of Sydney. It was discovered and named by Captain Cook in 1770: in his journal for Sunday, May 6, 1770, he wrote, "The great quantity of New Plants, etc., Mr. Banks and Dr. Solander collected in this place occasioned my giving it the name of Botany Bay." Chosen in 1787, on the recommendation of Banks, as the site of the first penal settlement in Australia, it proved unsuitable, and the settlement was established instead on the site on which now stands Sydney. The name Botany Bay continued, however, to be used as a popular term for any convict station in Australia; and in the course of time residential and industrial suburbs of Sydney came to line the bay: Sydney's main power station is at Bunnerong, and there is a large oil refinery at Kurrill.

Bot Fly. Name for various parasitic flies of the families Oestridae and Gasterophilidae, which are common in most parts of the world. The most familiar British types are those which infest the ox, the sheep, and the horse. The ox bot flies or ox warble flies (*Hypoderma bovis* and *H. lineatum*) lay their eggs on the legs and flanks of cattle, attaching them to the hair. The larvae burrow into the tissues until they reach the back where they cause swellings or warbles.



Bot Fly. (Left) *Gasterophilus intestinalis*; (right) *Oestrus ovis*

These, when numerous, affect the health of the animals, and spoil the hide for conversion into leather.

The sheep bot fly (*Oestrus ovis*) lays its eggs in the nostrils, and the larvae work their way up the nasal passages into the head. The horse bot fly (*Gasterophilus intestinalis*) deposits its eggs on the hairs of the host. The eggs, or the young larvae, are licked by the horse and are thus conveyed to the alimentary canal, where they attach

themselves by hooks to the walls of the gullet and stomach. Here they live for about a year, when they are expelled with the excrement and pupate in the ground.

Both. Surname of two Dutch brothers, Andries (1609-50) and Jan (1610-52), both born at



Both. Detail from an Italian landscape by Jan Both, in the National Gallery, London

Utrecht, who are remembered as painters. Their father was a painter of glass; they studied with him, and Jan was later apprenticed to Abraham Bloemart. About 1630 they went to Rome where they came under the influence of Claude Lorrain. Andries, who is said to have painted the figures into Jan's romantic landscapes, fell out of a gondola at Venice and was drowned in 1650. After his death Jan returned to Utrecht. He is represented at the National Gallery, London; the Louvre, Paris; Amsterdam and The Hague. His pictures are distinguished by clear, warm colour.

Botha, Louis (1862-1919). South African soldier and statesman. Born at Greytown, Natal, Sept. 27, 1862, the son of a Boer farmer, he passed much of his early life in the Transvaal, fighting for Dinizulu against his Zulu enemies, and serving as a native commissioner in 1884. In 1896 he was elected to the Transvaal Volksraad and, as an opponent of Kruger,



Louis Botha, S. African statesman

endeavoured to prevent war with Great Britain. But on the outbreak of the South African War in 1899, he at once joined in the invasion of Natal. His abilities soon brought him to the front; he commanded the Boers who defended the passage of the Tugela, and after Joubert's death was commander-in-chief until the end of hostilities. He was influential in persuading the Boers to accept the peace terms at Vereeniging.

Hostile to the Milner administration, but loyally accepting the new conditions and British sovereignty, Botha worked for the prosperity of the Transvaal, and on the granting of self-government became its premier in 1907. In 1910, as leader of the dominant Nationalist party, he was selected as the first premier of the new Union of South Africa — a union he had worked hard to establish. The first four years of his premiership were marked by the secession of General Hertzog and the more extreme Nationalists from the party in 1913, and by the general strike of 1914, firmly dealt with by the government, also by attempts to allay racial hatred and to consolidate the country on a basis of material prosperity and order. In 1914, on the outbreak of the First Great War, Botha unhesitatingly declared for participation, and although he had to face rebellion, crushed this and conducted the model campaign that deprived the Germans of S.W. Africa.

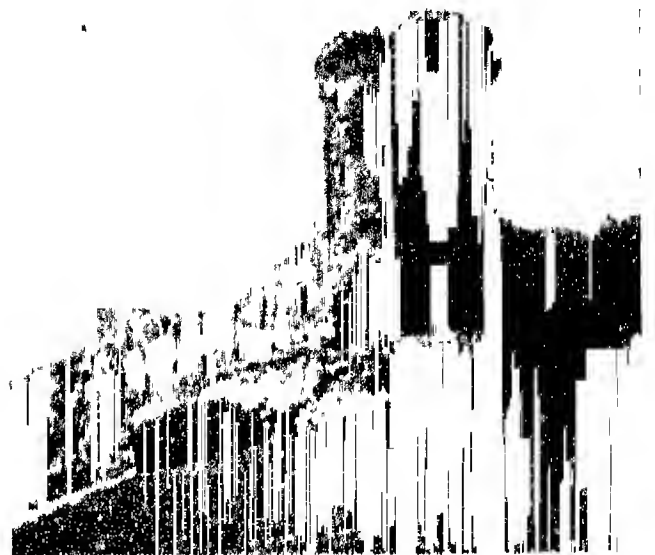
This done, he plunged into the strife caused by the pending general election. Botha's electoral programme was one of seeing the war through, but his party lost some seats and their majority in the House of Assembly. He remained in power, however, relying on the support of the Unionist party, and during the next four years was responsible for sending a contingent to fight in Europe and for a policy of loyalty to the Empire. In 1907 he was made a privy councillor, the only title he would accept, and in 1919 he attended the Peace Conference at Versailles, and signed the treaty with Germany. Returning to South Africa, he died Aug. 27, 1919. *Consult* Lives, H. Spender, 1920; Earl Buxton, 1924; V. Engelenburg, 1929.

Bothnia. Former name of the territory at the head of the Gulf of Bothnia. The W. part now belongs to Sweden and the E. to Finland.

Bothnia, GULF OF. The northern extension of the Baltic Sea. Extending N.N.E., it is bordered by Sweden and Finland, is about 410

m. long, has an average breadth of 100 m. and a maximum depth of 890 ft. It receives most of the large rivers of Sweden and Finland; contains numerous islands, including the Aaland group at the entrance, sandbanks and rocks, and has many harbours and towns on its shores. Its waters are only slightly salt, and it is frozen during the winter for from three to five months.

Bothwell. Parish and town of Lanarkshire, Scotland. On the Clyde, 8 m. by rly. S.E. of Glasgow, it gives its name to a co. constituency. It has coal and iron mines and quarries. Near is Bothwell Brig, where the Royalist



Bothwell Castle, Lanarkshire. Ruins of the ancient Scottish stronghold

forces defeated the Covenanters, June 22, 1679. Bothwell Castle, an historic fortress, is now in ruins. It stands on elevated ground called Bothwell Bank, round the base of which winds the Clyde, and is variously stated to have been built in the 12th and 14th centuries. Joanna Baillie, the poet (1762-1851), was a native of Bothwell. Pop. (1951) parish, 63,193.

Bothwell, JAMES HEPBURN, 4TH EARL OF (1536-78). Scottish noble. Educated by his granduncle,



James, 4th Earl of Bothwell

Bishop Hepburn of Moray, he succeeded his father as earl of Bothwell and hereditary lord high admiral of Scotland in 1556. Although he professed adherence to the reformed religion, he supported the government of the regent, Mary of Lorraine, by whom he was employed in France. His own turbulence and the jealousy of Murray involved him in a succession of riots and brawls, which led more than once to his imprisonment or exile. In 1565 Mary Queen of Scots, then married to Darnley, recalled him

from France, and in 1566 Bothwell married Jean Gordon, sister of the earl of Huntly. In the murder of Rizzio Bothwell had no part, but he joined the queen after her flight from Holyrood. In the plot against Darnley he was the chief actor, but he was acquitted after a trial which, as the chief prosecutor, Lennox, dared not attend, was little better than a farce.

In April, 1567, Bothwell seized and carried off the queen to Dunbar, and in May, when he had divorced his wife, they were married at Holyrood, Bothwell being made duke of Orkney and Shetland. But the nobles had risen in revolt, and when the rival armies met at Carberry Hill, Bothwell's forces dispersed without a struggle, and the queen became a prisoner. Bothwell escaped to Shetland, and thence to Norway. Arrested and sent to Denmark in Jan., 1568, he passed his remaining years in prison at Malmö and Dragsholm. in Zealand, losing his reason before his death, April 14, 1578. See *Casket Letters*; *Mary Queen of Scots*; *consult* Life, Character, and Times, R. G.-Browne, 1937.

Botocudos (Port. *botoque*, bung). Portuguese name of a South American Indian tribe. They inhabit forests between the river Pardo and the Doce river in eastern Brazil. The name indicates the wooden plugs worn in lower lip and ears. They are the best known representatives of the great Tapuya people (Tupi, enemies) which occupied the forest region until overcome by the Caraio. They live without stone implements, unclad, and use leaf-shelters. Their food, among which they include edible earths, is cooked in canes or eaten raw.

Botolph (d. c. 680). An English saint. Born in England, the son of Christian parents, he was sent with his brother, Adulf, to the Continent for study. Having become a monk, he returned to England, and was granted land in Leicestershire or Suffolk, where he established a monastery. More than 50 churches, for the most part in East Anglia and Yorkshire, are dedicated to him, as well as two in London. His festival in England is June 17, in Scotland June 25.

Botoshani OR BOTOCHANY. Town of Rumania. Situated on the river Shiska, in the region of Suceava in N. Moldavia, it lies about 60 m. N.W. of Jassy with which it is connected by rly. It is a commercial centre, with important industries, which include the manufacture of paper, soap, cotton goods, and

clothing. Pop. (1948) 29,145. It is named after the Mongol chief Batu Khan (*q.v.*), grandson of Jenghiz Khan, who invaded Europe in 1235.

Bo Tree (*Ficus religiosa*). The sacred fig-tree of India, also called peepul. Tree of the family Urticaceae, it is a native of India, where it is held sacred to Buddha. It differs from the common fig in having undivided leaves of a heart shape with a long slender point or tail ("dripping point"), and from the banyan (*q.v.*) in that its lateral branches are not supported by prop-like roots. The leaves are continually in motion like those of the aspen, and are supposed to provide a cooler shade than other trees. Beneath the Bo Tree at Buddh Gaya, in Bihar, Gautama, after seven weeks of contemplation, became Buddha, the Enlightened. A branch conveyed to Anuradhapura, Ceylon (288 B.C.), is much venerated by pilgrims.

Botrytis (Gr. *botrys*, bunch of grapes). Composite genus of fungi consisting of their imperfect stages only, i.e. those which reproduce by asexual spores and have no sexual organs. Various species are commonly seen as a grey-white mould on decaying fruit, wood, etc.

Botta, CARLO GIUSEPPE GUGLIELMO (1766-1837). Italian historian. Born Nov. 6, 1766, at San Giorgio del Canavese, Piedmont, he studied medicine at Turin, and was arrested and imprisoned in 1792 for sympathy with the French Revolution. He was a member of the provisional government of Piedmont in 1799, and when Piedmont was incorporated with France was a deputy in the Corps Législatif. In 1830 he was pensioned by Charles Albert of Savoy. He died in Paris, Aug. 10, 1837.

Botta, PAUL ÉMILE (1802-70). French-Italian archaeologist. The son of Carlo Giuseppe Botta, he was born at Turin, Dec. 6, 1802. He collected natural history material in America; became Mehemet Ali's physician in 1830; was French consul at Alexandria in 1833; and French consular agent at Mosul in 1842. Beginning archaeological work at Nineveh, he proceeded, in 1843, to Khorsabad, where, aided by Flandin, he excavated Sargon's palace. The remains, removed to

Paris, formed the first Assyrian museum; and Botta's *Monuments de Ninive Découverts et Décrits*, filled five volumes, 1849-50. In 1848 he published *Inscriptions Découvertes à Khorsabad*. He was consul-general at Jerusalem, 1846, and Tripoli, 1857, and retiring in 1868, died at Achères, near Paris, April 18, 1870.

Bottesini, GIOVANNI (1822-89). Italian musician. Born at Crema, in Lombardy, Dec. 24, 1822, he studied music, specialising in the double-bass, at Milan, and then appeared as double-bass virtuoso in Italy. He composed several operas, Cristoforo Colombo and Marion Delorme among them, and an oratorio, The Garden of Olivet. He died at Parma, July 7, 1889.

Botticelli, SANDRO. Name by which the great Italian painter Alessandro di Mariano dei Filipepi (c. 1444-1510) is known. In his early days he was employed by an elder brother, Antonio, at goldsmith's work in Prato. He first studied painting under Fra Filippo Lippi. Afterwards he is stated to have worked with the brothers Pollaiuolo. In his paintings there is an escape from the rigidity of the earlier school, united with a survival of its spiritual feeling.

His special qualities as a painter are his acute sense of decoration, his intense love of swift and graceful movement, and his marvellous power of representing such movement; his extraordinary skill as a draughtsman for intricate and lineal design; and his ability to convey the feeling of open air. He was perhaps the first to give landscape its due share in art, and to realize the ideas of infinity and space. He had a masterly power of drawing animals, and of representing flowers and foliage.

His most notable pictures are in Florence, especially *The Birth of Venus*, *Adoration of the Magi*, *The Magnificat*, two of *Judith* and *Holofernes*, the extremely beautiful *Primavera*, *S. Augustine* in his *Study*, and *Calumny and Fortitude*.

Other examples are in the National Gallery, London.

His work in Rome, carried out between 1481 and 1483 for Pope Sixtus IV, is represented by the three frescoes in the Sistine Chapel, *The Temptation of Christ*, *Scenes*



Sandro Botticelli,
Italian painter
Self-portrait from his *Adoration of the Magi*, Uffizi Gallery, Florence



Botticelli's famous picture *La Primavera* (Spring). One of the most beautiful allegorical productions of the Renaissance, it is distinguished by harmony of thought and expression, and, despite the effects of time, remains a poem in colour

from the Life of Moses, and The Fall of Korah. One of his greatest Madonna and Child pictures, formerly in Prince Chigi's collection, went to a private purchaser in the U.S.A.; other works to galleries in Berlin, Milan, Munich, and Leningrad. Two frescoes from the Villa Lemmi are in the Louvre, in Paris.

Botticelli was responsible for designs supplied to many engravers, especially to Baldini, but no work of the graver has been identified as his. His drawings include a wonderful series of illustrations for Dante, executed partly in silver point and partly in pen and ink. Some of these are in Berlin, others are in the Vatican library. His latest picture was the wonderful group of the Adoration of the Shepherds in the National Gallery; as far as is known, the only picture he ever signed and dated. He died May, 1510, being buried in the church of Ognissanti, Florence. Consult Lives, H. P. Horne, 1908; A. Venturi, 1927. Pron. Bottychelly.

Botticini, FRANCESCO (c. 1446-97). Italian painter. Born at Florence, his art shows the influence of many contemporaries, notably of Botticelli. He is represented in the Florentine galleries, National Gallery, London, New York, and Stockholm. Pron. Bottycheeny.

Bottle (late Lat. *buticula*, little cask; Fr. *bouteille*). A narrow-necked vessel for holding liquids.

Of the various materials of which bottles have been made the skins of goats and other animals are probably the earliest. Skin bottles were used by the ancient Hebrews and Egyptians, and in classical antiquity, and they are still common in Asia, Africa, and S. Europe. In medioeval Europe leather was a popular material and gave rise to the common inn sign, The Leather Bottle. Glass is now the most general material for making bottles. The Italian peasants carry their wine in bottles made of gourds, and in the U.S.A. unbreakable bottles are made of paper. The Chinese make exquisite bottles of such intractable materials as jade and rock-crystal. See Glass.

Bottle-brush Plant (*Callistemon speciosus*). Evergreen shrub of the family Myrtaceae. It is native to Western Australia, and has alternate, lance-shaped leaves, and flowers in crowded spikes on the old shoots. The numerous stamens, which are a brilliant scarlet, are the most conspicuous feature of these flower-spikes, and as they stand out all around the spike they produce the form of a bottle-brush. The name bottle-brush is also applied to the N. American grass, *Setaria viridis*, from the similar shape of the flower-spikes.

Bottle-gourd (*Lagenaria vulgaris*). Genus consisting of a single species of the family Cucurbitaceae.

A native of the warm parts of Asia and Africa. it is an annual trailing herb with

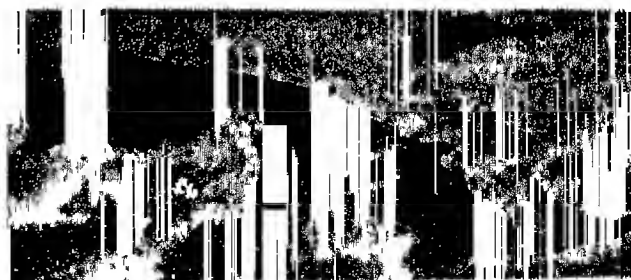


Bottle-gourd
Fruit and leaves

trailing herb with tendrils, and heart-shaped leaves. The flowers are white, the males distinct from the females, as in the related vegetable marrow. The fruit is variable in form,

but it is for the most part flask-shaped with swollen, rounded base and narrow neck.

Bottle-nosed Whale (*Hyperodon rostratus*). Species of whale whose high forehead and short,



Bottle-nosed whale, much valued for the excellence and quantity of its oil

narrow beak are somewhat suggestive of the shoulder and neck of a bottle. It inhabits the northern seas. The animals usually swim in small herds and are from 25 ft. to 30 ft. in length, light brown on the back and greyish white beneath.

They feed chiefly on small cuttlefish. The bottle-nosed whale is hunted for its oil, of which about two tons may be obtained from a good-sized adult, with about two cwt. of spermaceti. See Whale.

Bottle-tree (*Sterculia rupestris*). Evergreen tree of the family Sterculiaceae. A native of Australia,



Bottle-tree. Example of its curious trunk, from Queensland

it is remarkable on account of the bottle-like tapering of its trunk. The leaves are either simple and slender, or divided into from five to nine leaflets arranged like those of the horse-chestnut. The wood is of a loose texture and abounds in sweet mucilage, which can be used for food; and the fibres are used for making nets.

Bottling Machine. Device for filling and corking or capping bottles. In a typical machine used for filling bottles sealed with corks, the liquid is carried by pipes from the vat to a circular container, having attached to its underside twelve inverted funnels. Beneath each funnel is a metal cup to hold the bottles, twelve of which are filled at a time. Into the tube of each funnel a wetted cork is automatically placed and driven downwards by a plunger. A vent tube is also inserted in each bottle to provide an outlet for the air during filling. When a foot-lever is depressed, the cup holding the bottle is forced up against a rubber washer, this automatically turning on the liquid. A valve mechanism ensures that only sufficient liquid

flows through the funnel to fill the bottle, and immediately the bottle is full, the plunger descends and drives the cork fully home.

Another type of machine, extensively employed for filling milk bottles, works on a somewhat similar principle, but instead of a foot-pedal to raise the bottles to the filling nozzle, the nozzles are moved down to the bottles. The bottles are filled alternately, and as each is filled it is automatically pushed along a guideway to the capping machine. The capping machine is synchronised with the filling machine and is fitted with a battery of capping heads which cut out, stamp, and fix the aluminium caps. In machines capping milk bottles, the dies are changed each day according to the code letter denoting the day of filling. From the capping machine, the bottles pass on a transporter belt past an examining machine which automatically rejects any partly filled or faulty bottles. A machine of this type can fill 7,000 bottles an hour.

Bottom. Leading comic character in Shakespeare's *A Midsummer Night's Dream*. A weaver by trade, he takes the part of Pyramus, the lover, in a performance of a tragedy at the wedding of duke Theseus. Titania, queen of the fairies, falls in love with him while he is transformed with an ass's head.

Bottomley, GORDON (1874-1948). British poet. Born Feb. 20, 1874, at Keighley, W. Riding, Yorks, and educated there. His major works, e.g. *The Riding to Lithend*, 1909, *Gruach*, 1921, *Lyric Plays*, 1932, were metrical drama suitable for declamation. His verse was tragic in spirit and

metrically resourceful. He died Aug. 25, 1948. He was a close friend of Paul Nash. Their correspondence was published under the title *Poet and Painter* in 1955.

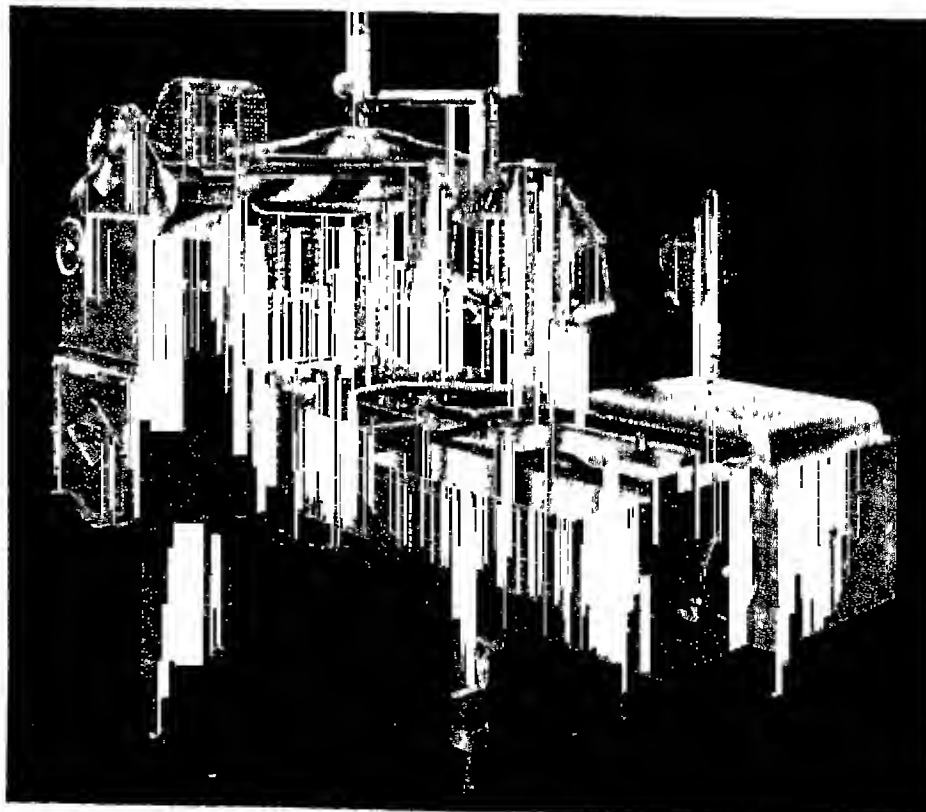
Bottomley, HORATIO WILLIAM (1860-1933). British journalist and financier. He was born March 23, 1860. In 1884 he started a group of London suburban weekly newspapers. It failed in 1891, and Bottomley was prosecuted, but, defending himself with skill, was acquitted. There followed a fantastic period of company-promotion which brought him great wealth, quickly dissipated. In 1906 he founded *John Bull* which at first specialised in sensational personal attacks. He was a consummate journalist, but his provocative statements and financial peculiarities caused his publishers to sever connexion with him in 1921. He was M.P. (first Liberal, then Independent) for South Hackney, 1906-12 and from 1918 until, sentenced in 1922 to seven years' penal servitude for fraud, he was expelled from the House. Released in 1927, he died in poverty, May 26, 1933. Consult *Lives*, H. J. Houston, 1923; S. T. Felstead, 1936; J. Symons, 1955.



Horatio Bottomley, British journalist and financier
Russell

Bottomry. Term for a nautical contract. It means the borrowing by the owner, or, under certain conditions, by the master, of money on the security of the vessel, and sometimes of the cargo, to enable her to make or complete a voyage. If the ship is lost the lender cannot recover the money from the borrower. If there are two bottomry bonds on a ship, and there is not sufficient money to discharge both, the second bond takes precedence of the first.

Bottrup. Town of Westphalia, Germany, 9 m. N.E. of Duisburg. It has large coal mines and a benzol plant. Pop. 82,159.



Bottling Machine. Automatic machine which fills and caps bottles of milk in a single operation
Courtesy of U.D. Engineering Co., Ltd.

Botulism. Acute variety of food poisoning which differs from that of the enteric group in that it is caused by a poison elaborated by the organism *Clostridium botulinus* and not by the organism itself. It is a very rare disease resulting from eating contaminated food, almost always tinned vegetables or fruit. Symptoms appear from 12-48 hours after infection. Nervous symptoms, usually eye symptoms such as difficulty in reading, double vision, dilated and fixed pupils, may be preceded by vomiting and diarrhoea. Difficulty in swallowing and speaking and giddiness follow. Death may occur from respiratory paralysis or pneumonia in from 4-8 days. Convalescence is very slow in those who recover. Mortality rate varies from 15 p.c.-70 p.c.

Anti-serum should be given as soon as the diagnosis is made. An injection of morphia should be given as this delays the action of the toxin. The stomach should be washed out and nasal feeding should be started.

Botwinnik, MIKHAIL (b. 1911). Russian chess player. Born in St. Petersburg (Leningrad) Aug. 17, 1911, he was a first class player at the age of 14 and in 1931 won the championship of the Soviet Union. He tied for first place with Capablanca in Moscow, 1935, and at Nottingham, 1936. After the Second Great War, he gained the world title, 1948, retaining it 1951, 1954, and 1956.

Bouaké. Town of the Ivory Coast, French West Africa, capital of a division of the same name. It is on the Abidjan-Ouagadougou rly. Its climate is pleasant, and there are colleges, a hospital, and an aerodrome. Pop. (1954) 38,830 Africans, 1,000 Europeans. The division of Bouaké produces coffee, cotton, tobacco, manioc; weaving and cattle- and horse-breeding are the chief occupations. Pop. (1954 est.) 360,000.

Bouch, SIR THOMAS (1822-80). British engineer, constructor of the first Tay Bridge. Born at Thursby, Cumberland, Feb. 22, 1822, he was son of a captain in the merchant service. At 17 he began to work for a railway engineer and in 1844 was made resident engineer on the Stockton and Darlington Railway. In 1849 he took a similar appointment on a Scottish line; and in 1854 he set up as a civil engineer on his own. He constructed the first Tay Bridge, opened on May 31, 1878 (its collapse in a gale Dec. 28, 1879, was a terrible blow to him). He died Oct. 30, 1880.

Boucher, FRANÇOIS (1703-70). French painter, the favourite artist of Mme. de Pompadour.



François Boucher, French painter
Painting by Rishen

Born in Paris, Sept. 29, 1703, he received his first instruction from his father, studied with Le Moine, and was for a time employed as an engraver and illustrator of books. In 1723 he gained the prix de Rome and later spent several years studying in Italy. After his return to Paris in 1731 he won admiration as the painter of voluptuous idylls and of portraits, including several of Mme. de Pompadour, and was elected to the Académie royale de peinture et sculpture. In 1755 he became director of the Gobelins tapestry factory, and in 1765 was appointed painter to Louis XV. He died in Paris May 30, 1770. He is represented at the Louvre,



Boucher. Idyllic pastoral scene by this 18th-century French painter

Paris; the National Gallery, London; and many other important galleries.

Boucher-Desnoyers, AUGUSTE GASPARD LOUIS, BARON (1779-1857). French engraver. He was born in Paris, Dec. 20, 1779, and studied under Lethière. In 1799 an engraving in the dotted style of Lefèvre's Venus and Cupid gained him a prize at the Salon. When in 1810 Napoleon commanded him to engrave a portrait of Marie Louise, he produced a likeness which was circulated throughout Paris. He became painter to Charles X in 1825 and a baron three years later. His engravings of Raphael's La Belle Jardinière and Leonardo's Virgin of the Rocks are masterly.

Bouches-du-Rhône. Department of France, traversed by the Rhône, which, navigable for 27 m. within the dept., flows into the Mediterranean through many channels. By 600 B.C. there was a Greek settlement in the area. Industries developed after the Second Great War include oil refining and the mining of lignite. Salt is produced from the marshes. Agriculture flourishes in the well-watered valleys; fruit, olives, early vegetables, wheat, the vine are important products. Rice is grown increasingly. On the great plains of Camargue and Crau, swept by the "mistral," sheep are reared and horses bred. Marseilles is the capital; other towns are Aix, Tarascon, and Arles. Pop. (1954) 1,048,762.

Boucicault, DION. Name adopted by Dionysius Lardner Boursiquot (1822-90). British dramatist and actor. Born in Dublin, Dec. 26, 1822, and educated at Bruce Castle school, Tottenham, and London University, Boucicault made his first appearance on



Dion Boucicault, British dramatist

the London stage at The Princess's, June 14, 1852, in his own play The Vampire. He wrote or adapted some 140 pieces, including London Assurance, 1841; The Octoroon, 1861; The Shaughraun in which he made a big success as an actor, 1875. His own The Colleen Bawn ran for 360 nights in London, 1860-61. He settled in the U.S.A. 1876, and died in New York, Sept. 18, 1890.

His son, Dion G. Boucicault (1859-1929), a successful producer, actor, and manager, married Irene Vanbrugh (q.v.).

His daughter, Nina Boucicault (1867-1950), was the first Peter Pan, 1903. She first appeared in her father's play, The Colleen Bawn, in the U.S.A., 1883. Making her début in London in The New Wing, 1892, she appeared also in The Light That Failed, 1903; Quality Street, 1913; Home Chat, 1927; Frolic Wind, 1935; Waste, 1936.

Boudicca. See Boadicea.

Boudin, LOUIS EUGÈNE (1824-98). French painter. Born at Honfleur, July 12, 1824, he went to sea as a boy, afterwards assisting his father in business at Havre. There he met various painters, the result being that he went to Paris to

study. A great painter of sea and sky, he first exhibited at the Salon in 1859, and for nearly 40 years he worked at his art, chiefly in Normandy. He helped to organize the first Impressionist exhibition, 1874. He died Aug. 8, 1898. He is represented in the Wallace Collection, London.

Boufflers, LOUIS FRANÇOIS, DUC DE (1644-1711). French soldier. Born in Picardy, Jan. 10, 1644, he entered the army serving in the wars of Louis XIV, and under Turenne in the Dutch Republic. He was made a marshal of France in 1693 after the victory of Steinkirk. He distinguished himself particularly by his defence of Namur in 1695 against William III, and of Lille in 1708 against Prince Eugène. After Malplaquet, the retreat of the French army was conducted under his orders with such skill that neither men nor cannon were lost. He died at Fontainebleau, Aug. 22, 1711. His son, Joseph Marie, duc de Boufflers (1706-47), was also marshal of France. *Pron.* Boof-lare.

Boufflers, STANISLAS JEAN, MARQUIS DE (1738-1815). French soldier and man of letters, commonly known as the Chevalier de Boufflers. Born at Lunéville, May 31, 1738, he joined the military order of the Knights of Malta, and after some years of service rose to the rank of marshal. He was governor of Senegal, 1785-87, and his administration of the colony was both humane and successful. He was made a member of the Academy in 1788, and of the states-general in 1789. He left France at the Revolution, but, having returned, was in 1814 made joint librarian of the Bibliothèque Mazarine. He died in Paris, Jan. 18, 1815.

Bougainvillaea. A genus of climbing shrubs of the family Nyctaginaceae. Natives of S. America, they have inconspicuous greenish flowers, yet are largely cultivated in greenhouses on account of their showiness, due to a number of rosy bracts by which the flowers are surrounded. The shrub is named after Louis Antoine de Bougainville.



Bougainvillaea.
Leaves and flowers

Bougainville. Largest of the Solomon Islands, Pacific Ocean. Under German control 1898-1914, it became Australian mandated

territory, 1921, and was placed under U.N. trusteeship, as part of the territory of New Guinea, in 1946. Kieta, on the E. coast, is the administrative h.q. of the island, which is 130 m. long by 40-60 m. wide; area, 3,880 sq. m. Of volcanic formation, Bougainville is almost entirely occupied by a forest-covered range, which includes Mt. Balbi, 10,170 ft., and Mt. Borgana, 6,560 ft., both active volcanoes. Its people are of Melanesian stock. The chief industry is copra production; of less importance are cocoa and rubber production, and the collecting of trochus and green snail shell. Minerals, known to exist, await exploration. Pop. (1954) 48,758.

During the Second Great War the Japanese landed on Bougainville at Kieta on April 6, 1942, and, the island being undefended, soon overran it. U.S. Marines landed in Empress Augusta Bay Nov. 1, 1943, and by Dec. 31 established an enclave which was not extended until Australian forces took over in Nov., 1944. In savage fighting, they drove the Japanese into pockets in the S.E. and N. of the island; some 20,000 surrendered at Torokina, on Empress Augusta Bay, on Sept. 8, 1945.

Bougainville, LOUIS ANTOINE DE (1729-1811). French navigator. Born in Paris, Nov. 11, 1729,



L. A. de Bougainville.
French navigator

he became an advocate, and then entered the army. In 1756 he distinguished himself as aide-de-camp to Montcalm in Canada. After serving in Germany in 1761, he left the army and in 1763 joined the navy and was sent to establish a French colony on the Falkland Islands. He was the first French seaman to circumnavigate the globe, and in his Voyage round the World (1766-69), Eng. trans. J. R. Forster, 1772, he added considerably to the geographical and scientific knowledge of the age. He died Aug. 31, 1811, and is commemorated by one of the Solomon Islands, a strait in New Hebrides, and by the shrub Bougainvillaea. *Consult* Life, M. Thiery, 1932.

Bough, SAMUEL (1822-78). British landscape painter. Born at Carlisle, Jan. 8, 1822, he spent many years as a scene painter and settled down as a landscape painter in Edinburgh in 1855. He was elected to the Scottish Academy

in 1875. He died in Edinburgh, Nov. 19, 1878.

Boughton, GEORGE HENRY (1833-1905). British painter and illustrator. Born near Norwich, Dec. 4, 1833, he spent his childhood in New York, his parents having emigrated, and subsequently studied in Paris before he settled in London, 1863. He first exhibited at the Royal Academy, 1863, and showed regularly until his death. He was identified with paintings of New England episodes and costume, and his narrative paintings of sentimental subjects were highly popular. He died Jan. 19, 1905.

Boughton, RUTLAND (b. 1878). British composer. He was born Jan. 23, 1878, and educated at



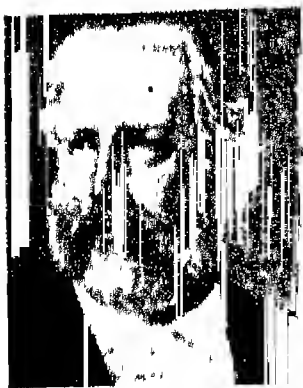
Rutland Boughton,
British composer

Aylesbury endowed school and the Royal College of Music. His first notable composition, *Midnight*, a choral and orchestral work, was performed at the Birmingham festival, 1909. In 1914 he founded, with Christopher Walshe, the Glastonbury festival, for which he wrote operas and music dramas, chiefly based on the Arthurian legends. The most successful was *The Immortal Hour*, a musical setting of the poetical fantasy by William Sharp (*q.v.*). Originally given at the Old Vic, London, 1920, it was performed with great success at the Regent Theatre, 1922-23, and revived 1926 and 1932. Boughton's other works include *Bethlehem*; *The Round Table*; *The Queen of Cornwall*; and a number of songs.

Bougie or **BUGIAH**. Seaport of Algeria. Situated on the Bay of Bougie and on the declivity of Mt. Guraya, it is 120 m. E. of Algiers, with which city it is connected by rly. via Beni Mansour. As the Saldac of the Romans it formed an important station in Mauritania, but later sank into obscurity. Part of the Roman wall exists.

In 1833 Bougie, then a small village, was captured by the French, who have since made it a strong fortress and commercial centre. In 1913 it ranked as the fifth port in Algeria. It has long been celebrated for the manufacture of *bougies* (wax-candles). On Nov. 11, 1942, it was occupied by British and U.S. troops (*see* N. Africa Campaigns). Pop. 30,659.

Bouguereau, ADOLPHE WILLIAM (1825-1905). French painter. Born at La Rochelle, he studied



William Bouguereau,
French painter

under Picot and in 1850 won the prix de Rome. He achieved popularity with *La Vierge Consolatrice*, 1877, and *The Birth of Venus*, 1879, and reproductions of the

first have made him widely known. The appreciation of a large public for his work has not been endorsed by critics and artists, for whom neither its fancifulness nor its classicism atones for the lack of reality and sincerity. He died Aug. 20, 1905.

Bouillon. Small town of Belgium. In Luxembourg prov., it stands 9 m. N.E. of Sedan, on both banks of the Semois. There are remains of its castle, below which the river flows almost in a circle. The counts of Bouillon, most famous member of which was Godfrey, a leader of the first crusade, 1096-99, took their name from here. Pop. (1947) 2,818.

Boulanger, GEORGES ERNEST JEAN MARIE (1837-91). French soldier. Born at Rennes, April 29, 1837, he entered the army in 1856. After service in Italy, Algeria, and Cochinchina, he returned to St. Cyr as an instructor. He was wounded early in the fighting for Paris in 1870. In 1881, as général de brigade, he was made inspector of infantry at the war office. In 1884, promoted général de division, he was sent to Tunis in command of the army of occupation.

Made minister of war in 1886 through Clemenceau's influence, with his youthful appearance, blue eyes, reddish hair, golden beard, and fighting record, he captured the fancy of the Paris mob; and leaders of more than one group representing French discontents with the Third Republic saw in him the figurehead required for a concerted attack on parliamentary government.

A new cabinet formed in 1887 did not include him, and to get him out of Paris he was appointed to a command at Clermont-Ferrand. His departure on July 8 provoked an immense popular demonstration. In Nov. he was back conferring with his supporters who by now included the Orléanists. He was put forward as candidate in several areas; the government suspended him for coming to Paris

without leave. He was triumphantly returned in a by-election in the Aisne; the government dismissed him from the army. He was badly wounded in a duel won by the premier Floquet.

Scandals affecting the president, Jules Grévy, forced Grévy's resignation; in new elections Boulanger was returned for three departments; and on Jan. 27, 1889, received 245,000 votes out of 424,000 in a by-election for a Paris vacancy: his enthusiastic supporters proposed an immediate march on the Élysée, and the government expected a *coup d'état*; but Boulanger did nothing.

Reprieved, the government abolished multiple candidacies, and issued a warrant for Boulanger's arrest; he fled (on April 1) to Brussels. In Aug. he was condemned in absence to perpetual imprisonment. In the elections of Sept., 1889, held

under the new law, his ill-assorted and leaderless followers were crushingly defeated, and he refused to return to France. He shot himself at Brussels Sept. 30, 1891, on the grave of his mistress, Mme Marguerite de Bonnemains. His ignominious failure ruined the Orléanist cause.



Georges Boulanger,
French soldier



Bouguereau. "Charity," a typical example of the work of this French painter
By permission of the Art Gallery Committee of the Corporation of Birmingham

Boulanger, NADIA JULIETTE (b. 1887). French composer, conductor, and teacher. Born in Paris Sept. 16, 1887, she was educated at the Paris Conservatoire, studying composition with Gabriel Fauré; and in 1908 gained the second prix de Rome for her cantata, *La Sirène*. She taught at the conservatoire and at the American conservatory at Fontainebleau, numbering Aaron Copland and Lennox Berkeley among her many pupils. Her compositions included music to d'Annunzio's *Città Morte*, and various orchestral and instrumental pieces.

Boulay de la Meurthe, COMTE ANTOINE JACQUES CLAUDE JOSEPH (1761-1840). French politician. Son of a Vosges peasant, he was called to the bar, and became a lawyer in Paris. He supported the Revolution in 1789, and fought at Valmy, but was forced to hide during the Terror. He assisted in framing the constitution for the consulate, and was employed by Napoleon in drafting the Civil Code and dealing with problems of land tenure. For this he was created a count. Proscribed during 1815-19, he died in Paris, Feb. 4, 1840.

Boulder. Mining town of Western Australia, 370 m. E.N.E. of Perth on the Transcontinental railway. It is on the Kalgoorlie goldfield, in the section called the golden mile which, opened c. 1900, reached its peak in 1903. The surface deposits have long been worked out, and mechanical methods are used to win low-grade ores from greater depths. Pop. (1954) 6,271.

Boulder Clay. Stiff clay containing boulders and stones of various sizes and having a glacial origin. The clay itself often shows affinities relating it to the local underlying bedrock, but the boulders may have travelled great distances. The deposit is derived from ground-up rock-flour and rocks carried by glaciers, and is laid down as the ice melts or the glacier retreats. It thus mantles the solid rock below; it fills pre-existing hollows, masks solid rock features, and often rests upon a rock surface smoothed, polished, and grooved by the passage of ice. The boulders are usually sub-angular in shape, and those that were carried at the bottom of the ice-sheet are polished and striated by their having been dragged over the solid underlying rock.

In the British Isles boulder clay occupies considerable areas north of the Thames-Severn estuaries; in N. America, north of the Great Lakes; in Europe, much of the N. European plain; all having been deposited by the great ice-sheets of the Glacial Period. In the British Isles Scandinavian boulders are common in the clays of the east of England; Shap granite is distributed a long way S. of its source; Scotch granites and Lake District rocks occur as boulders over the Cheshire plain and as far

S. as S. and W. Wales, indicating the direction in which the ice travelled across the islands. This deposit has modified the topography of Britain by filling valleys and estuaries, and by diverting the pre-existing drainage. Boulder clays of earlier periods exist in the Cambrian of Scandinavia and among the Permo-Triassic rocks of India, S. Africa, and Australia.

Boulder Dam. Name during 1936-47 of the Hoover Dam (*q.v.*), built across the Black Canyon of the Colorado River.

Boulē (Gr., great advice). Term used in ancient Greece for the council of government in Athens, Corinth, and other cities. Something of the kind existed in Homeric times, but nothing definite is known about its constitution and function until after the time of Solon.

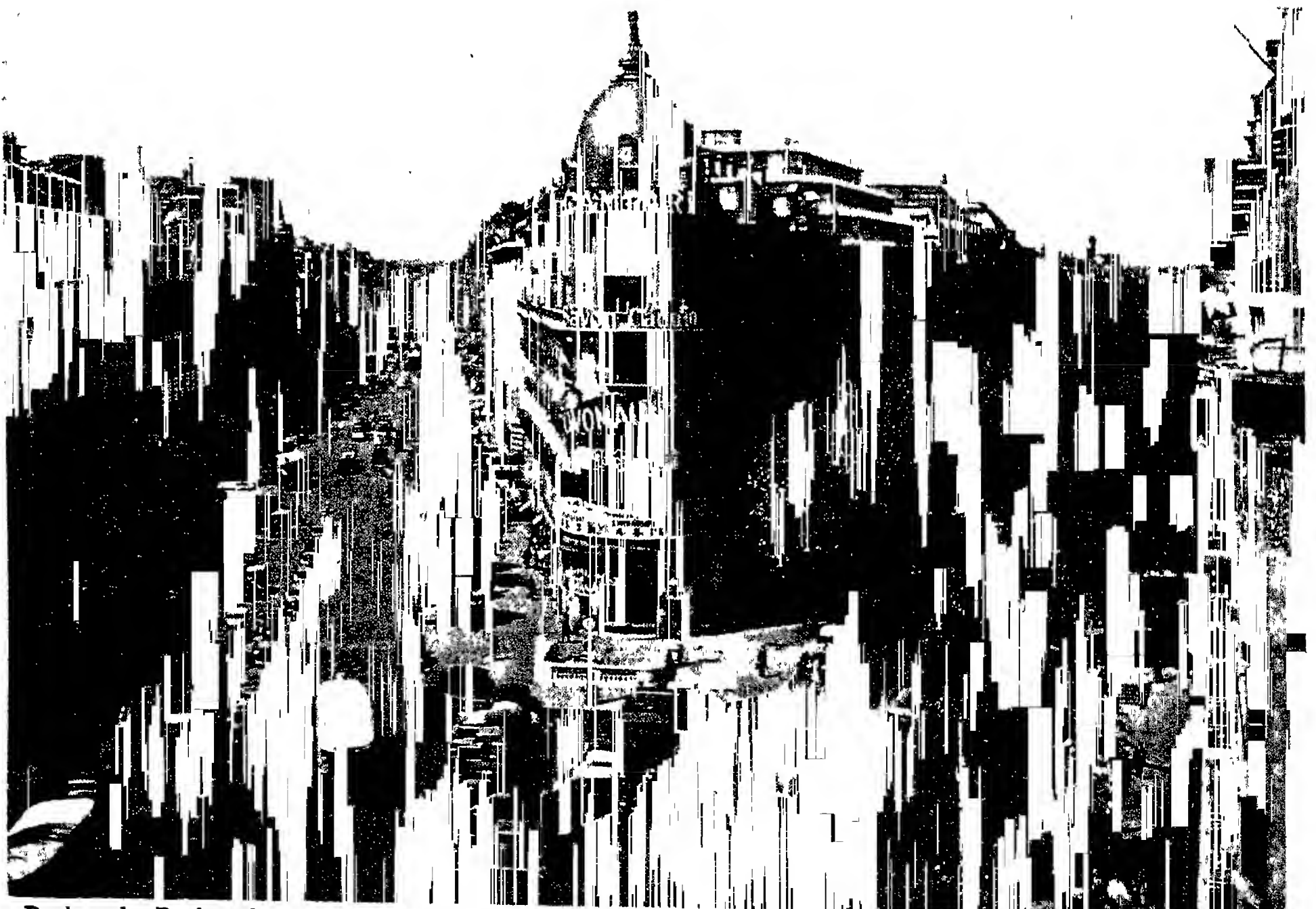
The boulē appears to have originated with Solon, but a more permanent form was given to it by Cleisthenes about 508 B.C. He raised the number of its members from 400 to 500, 50 from each of the ten tribes. Every part of Attica was represented, the members being chosen by lot. It was the supreme administrative authority, supervising the work of the archons and other magistrates, as well as the finances and the affairs of the army and navy. It was a court of justice, and al-

though powerless to make laws, had the right of considering and reporting upon all proposed legislation before this went before the ecclesia (general assembly) for confirmation or rejection.

The powers of the boulē were thus not unlike those of a modern cabinet. To save members from continuous attendance, the year was divided into ten parts, and the fifty members from each tribe acted in turn as a committee, carrying on the business for a tenth of the year.

Boulevard (Ger. *Bollwerk*, rampart). Word used for a broad street or avenue planted with trees. Originally a boulevard was an earthwork erected to hold artillery during a siege, and was usually built against the town walls. When the fortifications of many French cities were pulled down, the name was transferred to the promenades laid out on their sites. The boulevards of Paris are noted, and from France this scheme of town improvement spread to England and elsewhere.

Boulogne-Billancourt. Town of France, adjoining Paris. Called Menuls-lès-St. Cloud until in 1319 some citizens brought back a miraculous image from Boulogne-sur-Mer, built a church for it, and changed their town's name to Boulogne-sur-Seine, it was renamed



Boulevard. Boulevard des Italiens and Boulevard Haussmann, seen from Carrefour Richelieu-Drouet where they meet. Boulevard Haussmann is named after the French administrator responsible for much of the lay-out of present-day Paris



Boulogne. The fishing harbour of the port of France showing buildings put up to replace those destroyed during the fighting and air attacks of the Second Great War

Boulogne-Billancourt in 1925. It makes motor cars, bicycles, aeroplanes, and chemicals. Pop. (1954) 93,998.

Boulogne-sur-Mer. Town of France, chief fishing seaport of the department of Pas-de-Calais. It stands on the English Channel at the mouth of the river Liane 157 m. by rly. N. by W. of Paris. In the upper town the old ramparts surround the castle (13th century), used as a barracks; Louis Napoleon (the future Napoleon III) was imprisoned there for a short time in 1840. Near by is the cathedral of Notre Dame, rebuilt 1827-66. In the lower town is the port, a fine modern harbour much used for traffic between England and France; its roadstead is 108 acres in extent. There are salt and oil refineries, factories for preserving food and for making biscuits, chicory, linen, cordage, iron and steel goods; also ships' stores. Fish-curing is important.

Early called Portus Gesoriacus and later Bononia or Bolonia, after having been a possession of the duke of Burgundy it was joined to the crown in 1477 by Louis XI. The English held the town during 1544-50. A column crowned with a statue of Napoleon I commemorates the camp he set up here in 1804 with the intention of invading England. Boulogne was the birthplace of Sainte-Beuve, Mariette, and Constant Coquelin.

During the First Great War the town and port were under British military administration and some millions of British soldiers passed through its rest camps. The casino and many hotels were given up to the Red Cross. For the admirable

conduct of its inhabitants during aerial bombardments, Boulogne was awarded the Croix de Guerre.

Early in the Second Great War a medical base was established near Boulogne; and British rear headquarters moved back to the town for a few days in May, 1940. On May 22 the 20th Guards brigade and a force of Royal Marines were sent from England; Germans entered the town next day, and forced them out of it. German troops and barges later collected at Boulogne with the intention of invading England were heavily bombed. A successful British Commando raid was made near the port, April 22, 1942. During the war Boulogne underwent 487 aerial bombardments. Canadians liberated the town, much of it in ruins, in fierce fighting Sept. 17-22, 1944. Pop. (1954) 41,870.



Boulogne. The Calais Gate, with the cathedral of Notre Dame behind

Boult, Sir Adrian Cedric (b. 1889). British conductor. Born at Chester, April 8, 1889, he was educated at Westminster and Christ Church, Oxford, and subsequently studied music at Leipzig conservatorium. He was conductor for the Royal Philharmonic society 1918-19; taught at the R.C.M. 1919-30; and was musical director of the City of Birmingham orchestra 1924-30. In 1930 he became director and conductor of the B.B.C. symphony orchestra, giving up his directorship in 1942 to concentrate on conducting until he resigned to become chief conductor of the London Philharmonic, 1950-57. During Continental and American tours he introduced many English works, and his interpretations, especially of Elgar, commanded attention. He was knighted in 1937.

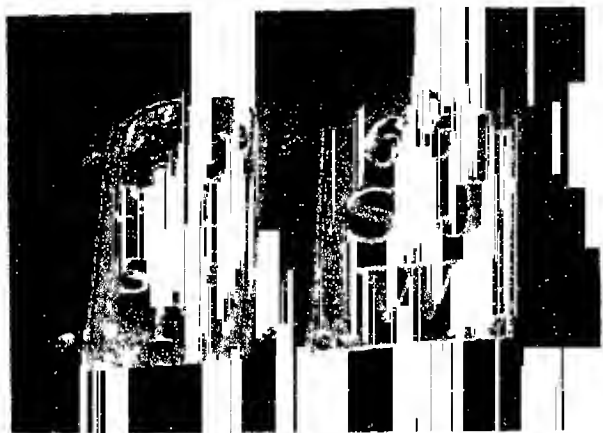


Sir Adrian Boult, British conductor

Boulton, Matthew (1728-1809). British engineer. He was born in Birmingham, Sept. 3, 1728, and entered and soon enlarged the business of silver stamper carried on by his father. In 1762 he opened works at Soho, near Birmingham, for the production of metal wares. The expansion of his factory made necessary a more abundant source of power, and in 1772 he entered into partnership with James Watt, who was trying to perfect his steam engine, at first intended only for pumping

purposes. Boulton's energy, and his money, which he pledged freely, were of great use to Watt. Boulton turned his attention later to the manufacture of coins and coining machinery. He died Aug. 18, 1809.

Boundaries. Lines forming the limits of a particular piece of land. Boundaries between nations con-



sist either of natural features, *e.g.* seas, rivers, mountains, etc., recognized by other peoples either tacitly or by definite agreement, or of lines fixed by treaty or arbitration. In England boundaries of local areas are determined by evidence, and are usually marked by stones, hedges, ditches, and the like. The Local Government Act of 1933 as amended by the Local Government Boundary Commission (Dissolution) Act, 1949, makes provision for the modification of the boundaries of cos., bors., urb. and rural dists., and parishes as required. In some parishes boundaries are periodically perpetuated by beating the bounds.

Boundary Commission. In the U.K., four permanent bodies of persons, one each for England, Scotland, Northern Ireland, and Wales, set up in 1944 and governed by the House of Commons (Redistribution of Seats) Act, 1949. They report periodically to the Home secretary as to any changes that should be made in electoral constituencies so as to secure as far as practicable that each constituency has the same number of electors. Before 1944 temporary commissions were set up only when a re-distribution of seats was contemplated—*e.g.* in 1918.

Bounds, BEATING THE. Old English custom for perpetuating

the parish boundaries. The ceremony took place annually on one of the Rogation days preceding Ascension Day (between April 27 and June 2). The parish priest, the churchwardens, the beadle, and other parish officials perambulated the boundaries accompanied by boys, who beat the boundary stones with boughs. As an aid to memory the urchins were sometimes beaten or bumped on the stones. Before the Reformation the prayer or asking (*Lat. rogare*, to ask) for a good harvest was a feature of the procession.

The custom may be a survival of the Roman Terminalia, the festival of Terminus, the god of landmarks, or of the Ambarvalia, when the



Bounds. Choristers of St. Clement Danes, Westminster, beating one of their parish boundary marks. Above, boundary marks on a wall of St. James's Palace: left, that of St. Martin-in-the-Fields; right, of St. James's, Westminster

boundaries were perambulated with prayers to Ceres or Dea Dia (*Ops*), both goddesses of agriculture and crops. In the north of England Rogation week is known as Gang (*go*) week, in allusion to the procession. Beating the bounds, where it survives, or has been revived, usually takes place every third year.

Bounty (*Lat. bonitas*, goodness). Term for a gift or benefaction of any kind. It has been, and still is, used for payments made to soldiers and sailors in addition to their pay, the equivalent of the civilian's bonus, and includes money given at the close of a campaign. The queen's (king's) bounty

is money sent to any British woman who gives birth to triplets.

In a special sense bounty is used for a grant of public money to aid a particular industry. In England there was a bounty on corn from 1688 to 1814, given to stimulate production, and more recently there have been bounties on sugar. In the 18th century bounties were freely given in England, and in the 20th Canada fostered some of her infant industries by this means. In other countries the fishing, shipping, and mining industries have been assisted by bounties. In 1907 the parliament of the Australian Commonwealth passed a Bounties Act to encourage the production of certain articles such as flax. See Queen Anne's Bounty; Subsidy.

Bounty, MUTINY OF THE. Mutiny in April, 1789, on H.M.S. Bounty. In Dec., 1787, Captain William Bligh (*q.v.*) was sent by the British government in command of the Bounty to the Society Islands. His mission was to collect bread-fruit and other vegetable products with a view to propagating them in the W. Indies. When he left Tahiti, part of his crew, after six months of easy living there, resented their departure and, finding Bligh's hot temper intolerable, mutinied under the leadership of Fletcher Christian; and on April 28, 1789, set the captain and 18 sailors loyal to him adrift in an open boat 23 ft. long with a small quantity of provisions and no chart. Bligh sailed this boat some 7,000 m. to Timor, which was reached on June 14.

Meanwhile the mutineers returned in the Bounty to Tahiti, whence nine of them, with a few native men and women, in 1790 sailed to uninhabited Pitcairn Island where they established a colony. Twelve of the mutineers who remained at Tahiti were subsequently captured and three were hanged. The colony on Pitcairn Island was not discovered until 1808; by then only one of the mutineers, John Adams, was alive; no proceedings were taken against him. Consult The Mutiny and Piratical Seizure of H.M.S. Bounty, John Barrow, new ed. 1914; The Wake of the Bounty, C. S. Wilkinson, 1953.

Bounty Islands. Group of 13 uninhabited islands in the S. Pacific belonging to New Zealand. Lying N. of the Antipodes Is. and about 415 m. S.E. of Port Chalmers, they were discovered by Captain Bligh in H.M.S. Bounty, 1788. There is a depot for shipwrecked mariners on the main island.

him out. His descendant, Charles IV, was driven from his throne by Napoleon, but, as in France, the Bourbons were restored in 1814. Ferdinand VII, dying in 1833, left only an infant daughter, Isabella, whose claim was contested by her uncle Carlos. In the civil war Isabella was victorious, and from her the last kings were descended.

The Spanish Bourbons also provided kings for Naples and dukes for Parma. In 1738, before his accession to Spain in 1759, Charles III had secured for himself the crown of Naples, with which Sicily was then united. When he became ruler of Spain he passed on his Italian kingdom to his younger son, Ferdinand. In 1814, Ferdinand, restored after his removal by Napoleon, called himself king of the Two Sicilies, and his descendants ruled there until deprived of the throne in 1860. In the same year the duchy of Parma, which had been ruled by a Bourbon during 1748-1801, and again from 1847, was also made part of the kingdom of Italy. Many representatives of the families formerly ruling in Naples and Parma are alive today, as well as a number of princes representing other younger branches of the French and Spanish Bourbons. The princes of Condé, famous in the history of France, were a branch of the Bourbons.

Bourbon, ÎLE. Older name of Réunion (*q.v.*).

Bourbon, CHARLES, DUC DE (1490-1527). French soldier, frequently called the Constable of Bourbon, whose army sacked Rome in 1527. He was born Feb. 17, 1490, a son of the count of Montpensier, head of a younger branch of the house of Bourbon; on his marriage to a granddaughter of Louis XI, the daughter and heiress of Peter, duke of Bourbon, Charles assumed the ducal title. He won early renown at the Battle of Marignano, was made constable of France by Francis I in 1515, and for a short time was governor of the Milanese; but he and the king quarrelled. When Bourbon's wife died in 1521 he was not allowed to retain possession of her lands. He therefore deserted his country and entered the service of the emperor Charles V. In 1524 he took command of the emperor's armies in Italy. He cleared the French from Lombardy, and followed them into their own country, but failed to take Marseilles. In 1525 he fought at Pavia, when Francis was defeated and captured; then made his memorable attack on Rome. Bourbon was driven by lack of

resources to lead his starving army to capture Rome, and was killed mounting the walls, May 6, 1527. Benvenuto Cellini claimed to have fired the shot. *Consult* Life, Christopher Hare, 1911.

Bourbonnais. One of the provinces into which France was divided before the Revolution. It grew up around the town of Bourbon l'Archambault, whence it took its name, and its lords, from the 10th century among the most powerful of the French nobles, were the ancestors of the kings of France from Henry IV onwards. The department of Allier covers most of Bourbonnais.

Bourbonne-les-Bains. Town and health resort of France, in the department of Haute-Marne. The Aquae Borvonis of the Romans, it is close to the river Amance, 35 m. by rly. N.E. of Langres. Its hot springs, with a temp. of 110°-150° F., are impregnated with chloride of sodium, and are beneficial in the treatment of rheumatism, arthritis, paralysis, and scrofula. Bourbonne-les-Bains has a 12th-century church, a ruined castle, and remains of Roman baths. Furniture is made, and there are sawmills and flourmills. Pop. (1954) 2,702.

Bourboule, LA. Town and spa of France, in the department of Puy-de-Dôme. It stands on the Dordogne, 22 m. S.W. of Clermont-Ferrand. Formerly a hamlet of no importance, it became a flourishing health resort on account of its hot mineral springs, which have a temperature of from 80° to 130° F. The waters are beneficial in the treatment of rheumatism and skin diseases; they are strongly arsenical and impregnated with bicarbonate of soda, and possess great radio-activity. Pop. (1954) 3,187.

Bourchier, ARTHUR (1864-1927). British actor manager. Born at Speen, Bucks, the son of a soldier, June 22, 1864, he was educated at Eton and Christ Church, Oxford. He helped to found the O.U.D.S., and made his first professional appearance as Jaques in *As You Like It* at Wolverhampton in 1889. He was in management successively at the Royalty, Garrick, Criterion, His Majesty's, and Strand theatres. He excelled in brusque, bluff parts, his *Long John Silver*, in *Treasure Island*, 1922, being outstanding. He died Sept. 14, 1927. Violet Vanbrugh (*q.v.*) was his wife 1894-1917. *Pron.* bow'cher.

Bourchier, THOMAS (c. 1405-1486). English cardinal, through

his mother a great-grandson of Edward III. He was educated at Oxford. In 1434 he became bishop of Worcester, in 1443 was translated to Ely, and in 1454 was made archbishop of Canterbury. He was lord chancellor 1455-56. When the Wars of the Roses began, Bourchier at first acted as a peacemaker in the interests of Henry VI, but after Henry's cause was lost, in 1461, he supported Edward IV, and he crowned Richard III and Henry VII. In 1467 he was a cardinal. He died March 30, 1486.

Bourdaloue, LOUIS (1632-1704). French preacher. He was born at Bourges, Aug. 20, 1632, and entered



Louis Bourdaloue,
French preacher

the society of Jesus in 1648. On the discovery of his powers as an orator in 1659 he was set apart solely to preach. In 1665 he toured France, and in 1669 was transferred to Paris. Thenceforward

he ranks with Bossuet as the greatest of French preachers.

On the revocation of the Edict of Nantes, Bourdaloue was sent on a mission to the Huguenots in Languedoc, and there both Protestants and Roman Catholics crowded to hear him. To contend with Protestant rationalism he boldly made use of the arguments of reason. He died in Paris, May 13, 1704.

Bourdillon, FRANCIS WILLIAM (1852-1921). British scholar and poet. He was acting as tutor to the sons of Prince and Princess Christian when his first book of poems, *Among the Flowers*, was published in 1878. Other works included a translation of *Aucassin et Nicolette*. The eight-line poem beginning "The night has a thousand eyes" is in many collections. He died Jan. 13, 1921.

Bourdon (French, bumble-bee). Organ stop. It is usually of 16 ft. tone, but sometimes of 8 ft. also, on pedal or manual, of the stopped-diapason type. Delicately voiced specimens are often called *Lieblich bourdon* or *sub-bass*. When of 32-ft. pitch, they are named *contra-bourdon*. Harmoniums have a *bourdon* stop.

Bourdon, SÉBASTIEN (1616-71). French painter. Born at Montpellier, Feb. 2, 1616, the son of a glass painter, he studied in Paris, and at an early age made his way to Rome, where he copied masterpieces for a living. On his return to Paris in

1643, he was commissioned by the goldsmiths' corporation to paint their annual votive picture for Notre Dame; this work, the Martyrdom of St. Peter, is in the Louvre. During 1652-54 he was a political refugee in Sweden, where he painted the historic portrait of Queen Christina. His greatest works were his ceiling decoration of the gallery of the Hôtel de Bretonvilliers (since demolished) and that in the Tuileries. His Descent from the Cross, in the Louvre, may be noted. He died in Paris, May 8, 1671.

Bourdon de L'Oise, FRANÇOIS LOUIS (1758-98). French revolutionary, born at Rouy-le-Petit (Somme). He sat in the convention, voted for the death of Louis XVI, helped to overthrow the Girondists, supported Danton, and to save himself joined Barras to secure the fall of Robespierre. He represented the department of the Oise; Bourdon was his own surname. A reactionary from the time of the *coup d'état* of 9 Thermidor (July 27), he became a member of the Clichyens, the royalist section of the council of the Five Hundred whose nickname came from a political society called the Club de Clichy. Bourdon was arrested by order of the Directory in 1797, deported to French Guiana, and died at Sinnamary in 1798.

Bourg-en-Bresse. Town of France, in the dept. of Ain. It is on the river Reyssouze 37 m. by rly. N.E. of Lyons. The church of Notre Dame dates from the 16th century. In the suburbs lies the church of Notre Dame de Brou (also of the 16th century) with its outstanding monuments. Bourg was the capital of the ancient province of Bresse, joined to the crown in 1691. It is an active agricultural centre, Bresse poultry being well known. Every year six days before Christmas a fair is held at which fowls steeped in milk and powdered white find a ready market. The town specialises in the manufacture of rustic Bressan furniture. Pop. (1954) 26,699.

Bourgeois. Term applied generally to a member of the mercantile or shop-keeping middle class of a community or country, sometimes in a disparaging sense. The word is French, and originally denoted a freeman or citizen of a bourg (borough), and later the class called comprehensively the bourgeoisie, between the nobility and the peasants. From its usual reluctance to cooperate in any violent disturbance of established conditions, it has incurred the resentment of the extremists in most

revolutionary movements, and in Russia the bourgeoisie was a special object of attack in the Bolshevik revolution of 1917.

Bourgeois. Name of an obsolete size of printing type (between brevier and long primer); about eight lines make an inch. *Proverb*: 'bur-joice'.

Bourgeois, LÉON VICTOR AUGUSTE (1851-1925). French politician famous for his early advocacy of a league of nations. He entered public service in 1877, became prefect of the Tarn in 1882, joined the ministry of the interior in 1886, was prefect of police in 1887,



Léon Bourgeois,
French politician
Manuel, Paris

and in 1888 was elected to the chamber as radical deputy for the Marne, being four times re-elected. He held several ministerial offices during 1890-93, was premier 1895-96, minister of public instruction, 1898, and in 1899 represented France at The Hague conference. President of the chamber of deputies, 1902-03, he became a senator in 1905, and was again several times a minister until 1917. Permanent delegate of France at The Hague from 1907, he was author of an early plan for a league of nations and in 1920 was awarded the Nobel peace prize. He died Sept. 29, 1925.

Bourgeois, SIR PETER FRANCIS (1756-1811). English painter. He was born in London of Swiss parentage, and studied under Louthenbourg. In 1791 he became painter to the king of Poland, by whom he was knighted. Elected R.A. in 1793, he was appointed landscape painter to George III in 1794. He died at Dulwich, Jan. 8, 1811. There are 20 of his pictures in the gallery he founded at Dulwich.

Bourgeois Gentilhomme, LE (the tradesman turned gentleman). Five-act comedy by Molière. The central character is M. Jourdain, an elderly tradesman who, having suddenly become rich, wishes to learn the ways of society. An amiably fatuous person, he wants to do everything by rule, and is delighted to discover that he had been talking prose all his life without knowing it. With M. Jourdain is contrasted the gentleman by birth, Count Dorante, who is little better than an adventurer. The play was produced at Chambord, Oct. 14, 1670. Molière played M. Jourdain.

Bourges. City of France, capital of the department of Cher, and formerly of the province of Berry. It stands at the junction of the Yèvre and the Auron 144 m. by rly. S. of Paris. Though it has important military engineering works, iron foundries, an aircraft industry, flourmills, oilmills, distilleries, printing works, and some of the largest oilcloth factories in France, it is a beautiful little town full of remains of the past. It was the Roman Avaricum, chief town of the Bituriges, taken 52 B.C. by Julius Caesar. The seat of an archbishopric, it has a very fine 12th-century Gothic cathedral with outstanding stained glass, and in every street lovely old buildings of the 14th, 15th, and 16th centuries, including the Palais Jacques Coeur (used as law courts), the town hall, and the Hôtel Kallemand. Bourges was the birthplace of Louis XI and of Bourdaloue. Because of its engineering works, it was heavily bombed during the Second Great War. Pop. (1954) 53,879.

Bourget. Lake of France, near Aix-les-Bains, in Savoie dept. Its length is 11 m. and its breadth 2 m. It empties into the Rhône, 2½ m. away, by the Canal de Savières.

Bourget, LE. Town of France, in the department of Seine. It is a few miles N.E. of Paris. In the Franco-Prussian War a furious battle was fought here in 1870. The French, eight officers and 80 men, were defeated after holding out to the last cartridge. A monument of the "broken sword" and a little chapel commemorate this heroic resistance. Le Bourget was made into an aerodrome at the beginning of 1914, and developed during the First Great War into a huge military air base. From 1920 it was an important civil airport, for long the only airport of Paris. Le Bourget was the flying-off point of Nungesser and Coli on May 8, 1927, when they vanished with their "white bird." Lindbergh landed here, May 21, 1927, after his solo flight across the Atlantic. Pop. (1954) 8,404.

Bourget, (CHARLES JOSEPH) PAUL (1852-1935). French poet and author, born at Amiens, Sept. 2, 1852. His first work, *La Vie Inquiète*, 1874, was a collection of verse. In 1883 he published critical studies, *Essais de Psychologie Contemporaine*. He continued his pessimistic analysis of contemporary life in his novels, *L'Irréparable*, 1884, and *Un Crime d'Amour*, 1886. He travelled widely, visiting the U.S.A. in 1893-94.



Bourges. Western façade of the 12th century cathedral. See page 1339

In 1886 Bourget published a second series of essays. Then came further novels, *André Cornélis*, 1887; *Mensonges*, 1887; and *Le Disciple*, 1889; followed by impressions of travel, *Études et Portraits*, 1889-1906; *Sensations d'Italie*, 1891; and *Outre Mer*, 1895, Eng. trans. 1895. His last books were *Le Sens de la Mort*, 1915; *Le Danseur Mondaine*, 1926. In 1894 he was elected to the French Academy. He died Dec. 25, 1935. *Consult* monograph, E. Dimnet, 1913.

Bourignon, ANTOINETTE (1616-1680). French mystic. She was born at Lille, Jan. 13, 1616, ran away from home to avoid marriage, and for a time after her father's death managed a hospital in her native town. She maintained that she saw visions, and that it had been specially revealed to her to restore the purity of primitive religion. The essence of her doctrine was that religion consisted in emotion rather than in belief or practice. Banished from France, she travelled in the Netherlands and Germany, winning many followers. But the sect dwindled after her death at Franckes, in E. Friesland, though it survived in Scotland until the close of the 18th century. Several of her works have been translated into English. *Consult* Life, A. R. MacEwen, 1910.

Bourke. Town of Cowper co., New South Wales, Australia. It is on the S. bank of Darling river, 503 m. by rly. N.W. of Sydney. It is a centre of sheep-farming, and has copper-ore mines.

Bourlon Wood, ATTACK ON. British operations of the Western Front in Nov., 1917, and Sept., 1918. They formed an important

part of the two great battles of Cambrai (*q.v.*). The wood lies 3½ m. W. of Cambrai, covering a gently rising eminence, reaching a level of 340 ft., and in shape is a rough circle about 2,000 yds. in diameter. The Germans were in possession of Cambrai, and also the wood, which was strongly organized for defence. On the opening day of the first battle, Nov. 20, 1917, British tanks pushed to its outskirts, but the infantry was too tired to support them. On Nov. 23 the wood was cleared by tanks of the 1st brigade, supported by infantry of the 40th division. Counter-attacks followed, and were mainly repulsed, though the Germans had regained a small footing in the E. edge of the wood by the time the Cambrai offensive was broken off on Nov. 27.

On Nov. 30 the German commander delivered his counter-stroke against the salient the British had created in front of Cambrai. This involved renewed attacks on the British troops holding Bourlon wood at one flank of the salient. Here the Germans were unsuccessful through the stout resistance of the 1st Berks. But they penetrated so deeply on the other flank that the wood was rendered untenable, and it was evacuated by order of Gen. Byng on Dec. 4-6.

It was finally captured in the second and decisive battle of Cambrai, Sept. 27, 1918, by the Canadian corps and the 7th tank battalion. It was attacked from the N. and the S., the 4th Canadian division storming the village of Bourlon to the immediate N., while the 3rd drove through the wood, smashing all strong points. Over 10,000 prisoners and 200 guns were captured, but British and Canadian losses were heavy.

Bourmont, LOUIS DE GHAISNES, COMTE DE (1773-1846). French soldier, born at Bourmont castle, Anjou, Sept. 2, 1773. As a royalist he became an exile in England during the Revolution, but returned to play a prominent part in the Vendean war, 1794-99. Eventually he took service under Napoleon. In 1814 he made his peace with Louis XVIII, but in 1815 he declared for Napoleon after the return from Elba, again deserting him before Waterloo. In 1830 he successfully commanded the expedition to Algeria, and was made a marshal, only to be deprived of his command by the revolution of that year. He refused to take the oath of allegiance to Louis Philippe and

retired to England. His last military service was in support of Miguel, pretender to the throne of Portugal, 1833-34. He died at the castle of Bourmont, Oct. 27, 1846.

Bourne or BURN. Anglo-Saxon name for a brook, stream, torrent, or rivulet. It is frequently found in British place-names, *e.g.* Bourne, Bournemouth, Sittingbourne, Banockburn, Tyburn.

Bourne. An urban district and market town of the parts of Kesteven, Lincs, England. It is 10 m. W. of Spalding. It has a Norman church and traces of a castle of Hereward the Wake, also the Old Red Hall in which the Gunpowder Plot is said to have been hatched. It was the birthplace of the 1st Baron Burghley. Market day, Thursday. Pop. (1951) 5,105.

Bourne, FRANCIS (1861-1935). English cardinal and archbishop of Westminster. He was born at



Francis Bourne, English cardinal
Russell

Clapham, London, March 23, 1861, and was educated at Ushaw, S. Sulpice, Paris, and Louvain. Ordained priest in 1884, after serving at Blackheath, Mortlake, and

West Grinstead, he founded the Southwark diocesan seminary, and in 1889 became its rector. In 1897 he became bishop of Southwark, and in 1903 succeeded Cardinal Vaughan as archbishop. In 1911 he became a cardinal. His chief publication was on ecclesiastical training. He died Jan. 1, 1935. *Consult* Life, E. Oldmeadow, 1944.

Bourne, HUGH (1772-1852). Founder of Primitive Methodism in England. Born at Fordhays, Staffordshire, April 3, 1772, he was brought up a Wesleyan, became a local preacher, and in 1807 began holding camp meetings. These were condemned by the Wesleyan Conference, and in 1808 Bourne was expelled from the denomination. He gained many followers, commonly known as "ranters," who formed themselves into a separate sect in 1811, and adopted the style of the Primitive Methodist Connexion in 1812. Their first chapel was built at Tunstall, and their first annual conference was held at Hull in 1820.

Bourne, who worked as a carpenter and builder the greater part of his life to avoid taking a stipend from the denomination, made many preaching tours in Great Britain and Ireland, and visited

the U.S.A. with great success in 1844-46. He lived to see over 5,000 Primitive Methodist chapels built, with a membership of 110,000. He wrote a history of the new body (1823), and founded and edited the Primitive Methodist Magazine. He died Oct. 11, 1852.

Bournemouth. Co. borough and resort of Hampshire, England. It stands in the pine-clad valley of the Bourne rivulet on Poole Bay, 107 m. S.W. of London by the railway. Its equable climate and picturesque chines make it a fashionable health resort. Originally a fishing village, it sprang into popularity about the middle of the 19th century.

Firm, clean sands afford excellent bathing at all states of the tide; and one acre in every ten consists of public parks and pleasure gardens, among them the public gardens, which follow the Bourne and extend from the coast to the extreme inland limit of the town; the Pine Walk, a splendid avenue from the Arcade to the pier; Boscombe Chine Gardens, from Christchurch Road to the sea; Durley, Middle, Alum, and Branksome Chines, the last two laid out as public gardens. There are 18-hole golf links at Meyrick Park and Queen's Park. Yachting in Poole Harbour is a favourite pastime, and during the season steamers ply between Bournemouth and the Isle of Wight. Bournemouth is also a centre of historic and scenic interest—the Hardy country, the New Forest, Salisbury, and Stonehenge being within the distance of a half-day's excursion.

The modern entertainment pavilion, built at a cost of £300,000, provides concerts, plays, and dances all the year round. In the decade before the Second Great War a million pounds was spent on new entertainment and recreational facilities. Public buildings include fine modern churches, free libraries, and the Russell-Cotes art gallery and museum, presented to the borough

by Sir Merton Russell-Cotes, together with his residence, East Cliff Hall. The national sanatorium was established in 1855; and there are several convalescent homes. The town was the first in England to instal electric tramways later superseded by trackless trolley vehicles (buses). Bournemouth is well served by rly., and there is an airport at Hurn 6 m. to the N.

As a memorial of the First Great War a Temple of Memory was erected in the upper pleasure grounds; and in 1945 it was decided to build houses for occupation on a nominal payment by ex-service men and women and their dependants. Casualties and damage were caused by numerous air raids from Nov., 1940, to April, 1941, and in a daylight attack on May 23, 1943. Bournemouth was incorporated in 1890, became a co. bor. 1900, a parl. bor. 1918. Under the 1948 re-distribution, Bournemouth with Christchurch formed two bor. constituencies. Pop. (1951) 144,845.

Parry, the composer, was born here. R. L. Stevenson lived in Alum Chine, 1884-87. The town is Sandbourne in Hardy's *Tess of the D'Urbervilles*.

Bournville. S.W. suburb of Birmingham, Warwickshire, England. Richard and George Cadbury moved their factory here in 1879, and during 1893-1900 bought land in the area and built houses, which since 1900 have been owned and administered by the Bournville Village Trust. The estate is vested in the Charity Commissioners and controlled by a body of trustees. All balance of income over expenditure is used for new housing



Bournville, near Birmingham. Examples of private building on the Bournville Village Trust Estate
Photo, courtesy of Cadbury Bros., Ltd.

at Bournville and for improving the estate and encouraging housing and town planning elsewhere. Bournville estate, on which there are more than 3,000 houses, is c. 1,000 acres in extent; the houses are not reserved for Cadbury employees. The trust owns also 2,300 acres of farm land, and manages 456 acres of farm land and woods for the National Trust.

Bourrée. Old French or Spanish dance. In two or four time, it is similar to the gavotte, but begins on the fourth crotchet of the bar and is quicker in pace. Examples are found in the suites of Bach and other 17th and 18th century composers. See Gavotte; Suite.

Bourrienne, LOUIS ANTOINE FAUVELET DE (1769-1834). French diplomatist. Born at Sens, July 9, 1769, and educated at the military school at Brienne with Napoleon Bonaparte, he is chiefly remembered for his inaccurate *Mémoires sur Napoléon* (1829). As a skilled lawyer he was summoned to Italy in 1797 by Napoleon to assist in negotiations with Austria, went with him to Egypt as secretary, and afterwards helped to set up the consulate. Owing to his accessibility to bribes and his lukewarm support of the Continental System when French representative at Hamburg, he fell into disgrace, 1810. He became a royalist in 1814, and fled to Holland during the Hundred Days. After 1815 he sat in the French assembly. About 1832 he became insane. He died at Caen, Feb. 7, 1834.

Bourse. French word meaning purse, but used in special sense for an exchange, especially a stock exchange. The Bourse *par excellence* is the Stock Exchange of Paris, a fine building not far from the Palais Royal. Built in 1808-26, it is surrounded by Corinthian pillars, and the interior is finely decorated.



Bournemouth, Hants. Pavilion and gardens in this favourite S. Coast health resort
Photo, Southern Railway

The large hall has the *parquet*, reserved for the *agents de change* or official members, at one end; the *coulisse* is for unofficial members.

Bourse du Travail (Fr., work exchange). The first *bourse du travail*, which aimed at centralising labour supply and demand, was set up in 1790, but did not last. After several unsuccessful attempts at resuscitation, one was effectively started in Paris Feb. 3, 1887. In 1888 Nîmes followed, then Marseilles. There were 14 *bourses du travail* in France in 1892, 150 by 1908. They are financed by town councils, but are managed independently by administrators elected for three years by members of trade unions. Their main objects are to help the trade unions to organize educational courses, to provide accommodation for meetings, to give members legal advice, and to provide libraries.

Boussingault, JEAN BAPTISTE JOSEPH DIEUDONNÉ (1802-87). French chemist and agriculturist. Born in Paris and educated at St. Étienne, he served under Bolívar in S. America, whither he had gone as a mining engineer. He became professor of chemistry at Lyons, and in 1839 a member of the Institute and professor of agriculture in Paris. His most important work was a treatise on rural economy (1844), later enlarged and republished as *Agronomie, Chimie Agricole et Physiologie*. He died May 11, 1887.

Boussu. Town of Belgium, in the prov. of Hainaut. Situated in the coalmining district, 7 m. by rly. W. of Mons, it has foundries, smelting works, and engineering and boat-building shops. There is an old castle. Pop. (1947) 12,325.

Boutroux, ETIENNE EMILE MARIE (1845-1921). French philosopher. Born at Montrouge, Seine,



É. É. M. Boutroux,
French philosopher
Manuel, Paris

July 28, 1845, he was educated in Paris and at the university of Heidelberg. His *De la Contingence des Lois de la Nature* appeared in 1874. After holding professorships of philosophy at the universities of Montpellier and Nancy, he became professor of modern philosophy at the university of Paris in 1888, director of the Thiers Foundation in 1902, and a member of the Academy in 1914. In 1914 he visited England.

Boutroux's studies of Pas-

cal (1900) and William James (1911), and his *Questions de Morale et d'Éducation* (1895) were translated into English. He translated part of the Greek Philosophy of his master Zeller from the German. One of Boutroux's most important works was his *Philosophy and War*, Eng. trans. F. Rothwell, 1916. His teaching emphasises the spiritual nature of the universe, and has affinities with the pragmatism of James. He looks to the future for his ideals. He died Nov. 21, 1921.

Bouts, DIERICK (c. 1410-75). Dutch painter. Born at Haarlem, he settled at Louvain, where in 1468 he became official painter to the town council, executing for the hôtel de ville the two large pictures, later in the Brussels Museum, dealing with the unjust judgement of the emperor Otho and his reparation. He is represented in the Munich Gallery, S. Peter's, Louvain, the Louvre, and the National Gallery, London. He died May 6, 1475.

Bouts Rimés (French, rhymed ends). Rhyming words selected by one person as the terminals of verses to be written by another. The amusement was fashionable in France in the 17th century, and was revived in the 19th by Alexandre Dumas (1802-70), who collected sets of verses written by different poets to rhymes chosen by Joseph Méry, and published them in 1865. Dante Gabriel Rossetti (1828-82) and his brother William Michael Rossetti (1829-1919) were skilled in writing sonnets to *bouts rimés* and William published examples in *The Germ*, the Pre-Raphaelite journal.

Bouvardia. A genus of evergreen shrubs of the family Rubiaceae, natives of Mexico and S. America. The leaves are egg-shaped, oblong, or lance-shaped, and the flowers are long and funnel-shaped, in clusters at the ends of the shoots. The flowers are red, yellow, or white, most of them fragrant. Under cultivation many hybrids have been produced. It takes its name from C. Bouvard (1572-1658), court physician and director of the royal gardens under Louis XIII of France.

Bouvet. Uninhabited island in the S. Atlantic, since 1930 a dependency of Norway. The area is about 22 sq. m. It was discovered by Pierre Bouvet, a Frenchman, in 1739, but no flag was hoisted before that of Great Britain in 1825. A Norwegian whaling expedition occupied it in 1927, and after a dispute between the British and Norwegian governments the former waived its claim. There is a wireless station.

Bouvet, JOACHIM (d. 1732). A French Jesuit missionary. Sent by Louis XIV's minister Louvois to China with five other Jesuits in 1686, he arrived at Peking, 1688, and at once won the favour of the Manchu emperor, Khang-hi. He became mathematical master at the imperial court, acted as envoy between Khang-hi and Louis XIV, and was engaged on a valuable survey of China. In addition to preparing a number of maps, he wrote *État Present de la Chine en Figures* (1697), an historical portrait of Khang-hi (1697), and several mathematical treatises.

Bouvines, BATTLE OF. Fought July 27, 1214, between the French under Philip Augustus and an allied army collected by the emperor Otto IV and John of England. Bouvines is a village between Lille and Tournai. The allied plan was that Otto and his friends in the Netherlands should invade France from that direction, while John advanced from the south. Otto was late, and John, declining to wait for him, returned to Guienne. Philip meanwhile marched with an army towards Flanders.

Near Bouvines he came up with Otto's host and, having chosen his ground, offered battle. Each army contained probably 30,000 or 40,000 men. With Otto was an English contingent under the earl of Salisbury. When the battle was joined each had infantry massed in the centre, cavalry on the wings, and a reserve behind. Gradually the French gained the upper hand, the reserves joined in the fight, and at length the allies were routed. Many, including Salisbury, were taken prisoner, but the number of dead can only be conjectured vaguely. The political results of the battle were most marked in England and in Germany. In England John, realizing that his cause was lost, submitted and signed Magna Carta; in Germany Otto's power declined before that of his rival, Frederick II. *Pron.* Booveen.

Bovate OR OXGANG (Lat. *bōs*, *bov-is*, ox). Old English land measure. Based on the amount of land an ox could plough in a year, it varied from 10 to 18 acres.

Bovey Tracey. Parish and town of Devon, England. It is on the river Bovey, 6 m. S.E. of Moretonhampstead, and on the edge of Dartmoor. It is served by rly. The church of S. Thomas Becket was traditionally founded by Sir William de Tracey, to expiate his part in Becket's murder. The present building, chiefly 15th-century, has a fine painted screen. There was a pottery here during 1772-1956. Pop. (1951) 3,649.

Bovey Tracey Beds. Series of sands, clays, and lignites. They are over 600 ft. thick and 9 m. by 4 m. in extent, and occupy an old lake basin in the Teign valley, Devonshire, between the granite of Dartmoor on the W. and the hills of carboniferous rocks on the E. Doubtfully regarded as of Oligocene age, the deposits are valuable on account of the lignites, but more especially for certain pottery clays.

Bovidae (Latin *bos*, genitive *bovis*, ox, cow). One of the great families into which the order Artiodactyla (even-toed ungulates) is divided. It includes cattle, sheep, goats, and antelopes, comprising over 100 genera and 200 species, of which the great majority are antelopes. This group is not so nearly related to the Perissodactyla (odd-toed ungulates, e.g. the horse) as used to be thought. The Bovidae may be defined as hollow-horned mammals which ruminate or chew the cud. The fact that their horns are hollow and made of ceratin separates them from the antlered deer, whose antlers are of bone. They have no incisors or cutting teeth in the upper jaw, and the upper canine teeth are either absent or rudimentary.

One remarkable feature is the complex stomach, divided into four compartments, especially adapted for ruminating. The first compartment, or paunch, receives the food when it is first swallowed. Here it is softened and then regurgitated in boluses to the mouth for leisurely chewing. It then passes through the upper groove of the second compartment to the third, where a kind of filtering process takes place. It is then passed to the fourth compartment, where it is mixed with the gastric juice and digested. The majority of the Bovidae are natives of the Old World. They abound in Africa. See Ox.

Bow. A weapon for propelling arrows. Made of a flexible piece of wood and a length of cord, the bow has been used from the earliest ages in all parts of the world. The long bow is made of bamboo, yew, etc. Two staves dating from 1545 are in the Royal United Services museum, Whitehall, London; they are of yew, length 6 ft. 4½ ins., girth at centre 4½ ins. A long bow of lance wood is 7 ft. 8 ins. long. Henry VIII used to import staves from the Baltic and from the East for his bows. The word means anything that is bent. See illus. p. 565.

Bow (A.S. *bogan*, to bend). Stick strung with horsehair used for producing sound and tone from instruments of the viol and violin families. Name and earlier forms were derived from the weapon.

Bow or STRATFORD-LE-BOW. An eastern suburb of London, England. It lies within the met. bor. of Poplar, 3 m. E. of St. Paul's. Named from the bow or arched bridge over the Lea, which replaced the ford in the reign of Henry II, it had a Norman-French school, referred to by Chaucer in "French she spake . . . after the scole of Stratford-atte-Bowe." Bow has breweries, foundries, and manufactures.

Bow. A river of Canada. It rises in the Rocky Mts., flows E. through Alberta, and unites some miles W. of Medicine Hat with the Belly to form the South Saskatchewan; length 315 m. Its water is used for artificial irrigation.

Bow Church. London church, in full S. Mary-le-Bow, or S. Maria de Arcubus. Built in 1671-87, it is on the S. side of Cheapside, and possesses one of Wren's finest steeples, in height about 220 ft. Of the first church, built in Norman times, the crypt (c. 1090) remains. In 1914 a stone from it was placed in Trinity Church, New York, in memory of the grant by William III to that church of the right of sanctuary formerly possessed by S. Mary-le-Bow. The eccles. Court of Arches sat here until the Great Fire, and the legal confirmation of bishops was performed in the church until about 1900, when the ceremony was transferred to the Church House, Westminster. The church chimes were rearranged in 1904, when Sir Charles Stanford revived the old tune, Turn again, Whittington. On the exterior of the W. wall is a memorial to Milton, removed from All Hallows in 1878. The church was gutted by German incendiary bombs on May 11th, 1941, only walls and tower remaining. Anyone born within the sound of Bow bells is defined as a Cockney. Their chime was adopted by the B.B.C. as interval signal from 1933. See illus. p. 570.

Bowden, Sir Harold (b. 1880). British industrialist. Born July 9, 1880, he was educated at Clifton and Clare College, Cambridge, and subsequently became associated with a number of important industrial concerns, e.g. as chairman of the Raleigh Cycle Co., Rudge-Whitworth Ltd., and Sturmey-Archer Gears, Ltd., and as vice-president of the Federation

of British Industries. He succeeded as 2nd baronet, 1921.

Bowden Control. System of remote control for the mechanical operation of brakes and throttles. Invented by Ernest Bowden (1860-1904), it consists of an inner member of fine wire strands twisted together and passing through a flexible protective sleeve. One end of the inner member is fixed to the controlling unit of the mechanism to be operated and the other end is joined to a hand lever. Pressure on the hand lever presses the inner member which in turn applies the brake, throttle, or other mechanism under control. A tension spring attached to the hand lever returns the inner member to normal and releases the mechanism. Bowden control is used on certain types of gun-mounting to release the bent from the sear and so allow the firing pin to move forward.

Bowdler, Thomas (1754-1825). British doctor and editor. Born at Ashley, near Bath, July 11, 1754, and educated at St. Andrews and Edinburgh universities, he graduated in medicine in 1776. Settling in London in 1781, he took a philanthropic interest in prison work. In 1818 he published *The Family Shakespeare* (10 vols.), in which "nothing is added to the original text; but those words and expressions are omitted which cannot with propriety be read aloud in a family." A similarly expurgated edition of Gibbon's *Decline and Fall of the Roman Empire* appeared 1826. The verb "bowdlerise" was coined to describe his surgery, and is commonly used with a derisory connotation which an unbiased examination of his Shakespeare does not justify. Bowdler died at Rhyddings, near Swansea, Feb. 24, 1825.

Bowel. Intestine of the body, part of the alimentary canal. In man it consists of the small intestine (duodenum, jejunum, and ileum) and the large intestine (caecum, colon, and rectum).

Bowen. Port of Queensland, Australia. It is 670 m. by sea and 713 m. by rly. N.N.W. of Brisbane, on Port Denison deep-water harbour. It is the centre of a district growing sugar, tomatoes, and orchard fruits; cattle, horses, pigs, and sheep are also raised, coal and gold are mined, and salt is harvested by solar evaporation of sea water. Pop. (1954) 3,714.

Bowen, Charles Syngé Christopher Bowen, Baron (1835-94). British judge. Born at Woolaston,

Jan. 1, 1835, after pursuing a brilliant career at Rugby and Balliol College, Oxford, he was called to the bar at Lincoln's Inn in 1861. After his performance as junior counsel in the Tichborne trial, the attorney-general in 1872 made him junior counsel to the Treasury. He became successively a queen's bench judge in 1879, a lord justice of appeal, 1882, and a lord of appeal, 1893. Bowen was the author of a translation of Virgil's Aeneid and Eclogues. He died April 10, 1894.

Bowen, ELIZABETH DOROTHEA COLE (b.1899). British author. Born at Kildorrery, co. Cork, Ireland, and educated at Downe House, Kent, she published her first book of short stories, *Encounters*, 1923, and her first novel, *The Hotel*, 1927. A writer of subtle delicacy,



Elizabeth Bowen
British author

her studies of finely expressed psychological situations were drawn with consummate skill in *The Last September*, 1929; *The Cat Jumps*, 1934; *The House in*

Paris, 1935; *The Death of the Heart*, 1938; *Look at All Those Roses*, 1941; *Seven Winters*, 1943; *The Demon Lover*, 1945. Her autobiographical *Bowen's Court*, 1942, gave a vivid picture of her Irish background.

Bowen, SIR GEORGE FERGUSON (1821-99). British administrator. The son of an Irish clergyman, he was born in Ireland, Nov. 2, 1821, and passed from Charterhouse to Trinity College, Oxford. In 1847 he was president of the university of Corfu and in 1854 secretary of the Ionian Is. Governor of Queensland from 1859, he reconciled the native peoples to British rule. He was governor of Victoria 1872-79, of Mauritius 1879-82, and of Hong Kong 1882-85. He acted as president of the royal commission on the administration of Malta, 1887-88. He died Feb. 21, 1899. Bowen, knighted in 1856, wrote *Ithaca*, 1850, and a *Handbook of Greece*, 1854.

Bowen, MARJORIE. Best known pen-name of Margaret Gabrielle Vere Campbell (1888-1952), a prolific British writer who wrote also as George R. Preedy and Joseph Shearing. Margaret Campbell was born at Hayling, Hants, and was chiefly self-educated. As Marjorie Bowen she wrote many successful

historical romances, notably the precocious *The Viper of Milan*, 1906, a story of the great days of the Visconti family, and *Black Magic*, 1909, concerning a woman who achieves the papacy by means of magic. As George R. Preedy, she attained considerable popularity with *General Crack*, 1928, and *The Rocklitz*, 1930. She also dramatised some of her novels, and wrote biographical studies e.g. of John Knox, Charlotte Corday, Paul Jones. Under her maiden name she published an autobiography, *The Debate Continues*, in 1939. She married (1) in 1912 Z. E. Costanzo (d. 1916); (2) in 1917 A. L. Long, who survived her. She died in London, Dec. 23, 1952.

Bowen, RICHARD (1761-97). British sailor. Born at Ilfracombe, he entered the navy and was made captain of the *Terpsichore* in 1794. After distinguishing himself in many engagements, notably in the single-handed capture of a Spanish four-decker off Cape St. Vincent in



Richard Bowen.
British sailor
From an old engraving

1797, he served under Nelson at the bombardment of Cadiz and was killed in the attack on Santa Cruz, July 24, 1797. His brother, Admiral James Bowen (1751-1835), joined the navy as master from the merchant service and was commissioner of the navy from 1816 to 1825.

Bower Bird. Name given to several species of Australian birds. They derive their name from their habit of constructing bowers, or covered runs, apparently for playgrounds, out of twigs and stiff grass, arranged to form a kind of tunnel among the bushes, and adorned with small pebbles, shells, bleached bones, etc.

Bowes. Village of Yorkshire (N.R.), England, 4 m. S.W. of Barnard Castle, where the boarding house for boys was carried on which figures as Dotheboys Hall in *Nicholas Nickleby*. A natural bridge of limestone, known as God's Bridge, crosses the Greta and there are remains of a Roman station. Pop. 565.

Bow Fell. Mountain of Westmorland, England. It is in the Lake District, 8 m. W. of Ambleside, and is 2,960 ft. high.

Bowfin (*Amia calva*). Kind of mud fish found in the lakes of N. America. It frequently comes to the surface to inhale air into its swim-bladder, and will live for an hour out of water apparently without ill effects. It constructs a rough kind of nest among the weeds at the bottom of the water for its eggs, which are carefully guarded by the male until hatched.

Bowhill, SIR FREDERICK WILLIAM (b. 1880). British air force officer. Born Sept. 1, 1880, educated at Blackheath school and in H.M.S. Worcester, he was an officer in the merchant service, 1896 to 1912, and held a commission in the R.N.R. 1898-1912. He was



Sir F. Bowhill,
British air force
officer

in command of the aircraft carrier *Empress* when sea-planes raided Cuxhaven Dec. 25, 1914; served in Mesopotamia 1916; and commanded an air unit in E. Africa 1917. Wing commander in 1919, he was A.O.C. fighter area, A.D.G.B., 1931-33, on the Air Council 1933-37, and knighted on relinquishing his appointment.

His work as A.O.C. Coastal Command from 1937 was responsible for the efficiency of air patrols protecting the wartime Atlantic convoys and engaged in hunting submarines. He was a strong supporter of the long-range flying-boat and initiated the system of sending Sunderlands and Catalinas far into the Atlantic to escort incoming and outgoing convoys. In 1941, he was appointed O.C. Ferry Command and organized the trans-Atlantic ferry. From 1943 to 1945 he was A.O.C.-in-C. Transport Command, and in 1946 became chief aeronautical adviser to the ministry of Civil Aviation.

Bowie Knife. General term in the U.S.A. for a large heavy sheath-knife. It is so called from the American pioneer James Bowie (d. 1836), who in 1827 killed Maj. Norris Wright with a hunting knife



Bower Bird. One species
of this Australian bird



Bowie knife and sheath

made from a file. A bowie knife forms part of the equipment of a Boy Scout. *Pron.* bo-ic.

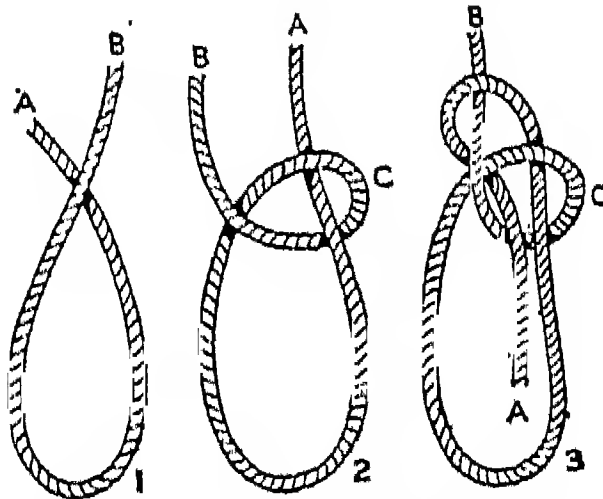
Bow-leg (*Genu varum*). Condition in which the legs

are curved outwards, usually resulting from rickets. The stage the condition has reached when the patient is first taken for medical advice influences the treatment. If active rickets remains, then that must be treated. In an early stage weight bearing should be discouraged, and gentle corrective manipulations carried out several times daily may help. Braces will sometimes aid correction. In the majority of cases the deformity is best corrected by a simple operative section of the bone, followed by the wearing of a plaster cast.

Bowles, WILLIAM LISLE (1762-1850). British poet and antiquary attacked by Byron in *English Bards and Scotch Reviewers*. Born at King's Sutton, Northamptonshire, Sept. 24, 1762, and educated at Winchester and Trinity College, Oxford, he was ordained in 1792, and became canon of Salisbury, 1828. He published anonymously in 1789 *Fourteen Sonnets*, which brought him fame. His edition of Pope, 1806, led to Byron's attack on him. Among other poetical works by Bowles are *The Missionary of the Andes*, 1815, and *St. John in Patmos*, 1833; his claim to rank as an antiquary is based on his *Hermes Britannicus* which appeared in 1828. Bowles also published a life of Bishop Ken, 1830-31. He died at Salisbury, April 7, 1850.

Bowley, SIR ARTHUR LYON (1869-1957). British statistician. Born at Bristol Nov. 6, 1869, he was educated at Christ's Hospital, and Trinity College, Cambridge. Lecturer in statistics 1895-1914, professor 1915-19, at the L.S.E., in 1919 he was appointed to the new chair of statistics in the University of London; he was made emeritus professor in 1936. During 1940-44 he directed the Oxford institute of statistics, and he collaborated in the production of the Beveridge report, 1942. He was knighted in 1950. His published works included *Wages in the U.K.*, 1900; *Changes in the Distribution of Income*, 1920; *Studies in National Income* (1924-38), 1942. He died at Haslemere Jan. 21, 1957.

Bowline. Form of loop knot. To tie it, lay the end of the rope marked B in the diagram over the standing part A; form with B a loop C over A; take A over B and through loop C. *Pron.* bo-lin.



Bowline. How the knot is made

Bowls (Lat. *bullā*, bubble, anything round). An outdoor game consisting of bowling large wooden balls on a stretch of level turf so that they come to rest as near as possible to a small white ball at the opposite end of the rink. According to a manuscript in the royal library at Windsor, bowls was played in England in the 13th century; certainly the Southampton town club has maintained its bowling green since 1299. Despite penal statutes in the interests of archery, bowls remained popular, and enjoyed the favour of kings and princes, Henry VIII being an enthusiast; and according to tradition on July 19, 1588, Sir Francis Drake played out on Plymouth Hoe (and lost) a rubber at bowls with Sir John Hawkins, before sailing against the Armada.

In the 17th century most bowling greens were associated with inns and taverns, and because of the gambling and drunkenness that accompanied it, the game became little better than a "pot-house" recreation. Bowling was re-organized as a serious game in the mid-19th century when Scottish players began laying out greens of seaside turf on private grounds, and W. W. Mitchell (1803-84) drew up the code of laws which, as revised by the International Bowling Board, governs the game in the British Commonwealth.

In Great Britain more than 2,000 clubs are affiliated to the English Bowling Association. International matches between the countries of the British Isles, and between the different countries of the British Commonwealth, are played, and there are club, city, district, and county championship competitions for single players, pairs, and rinks (teams of four).

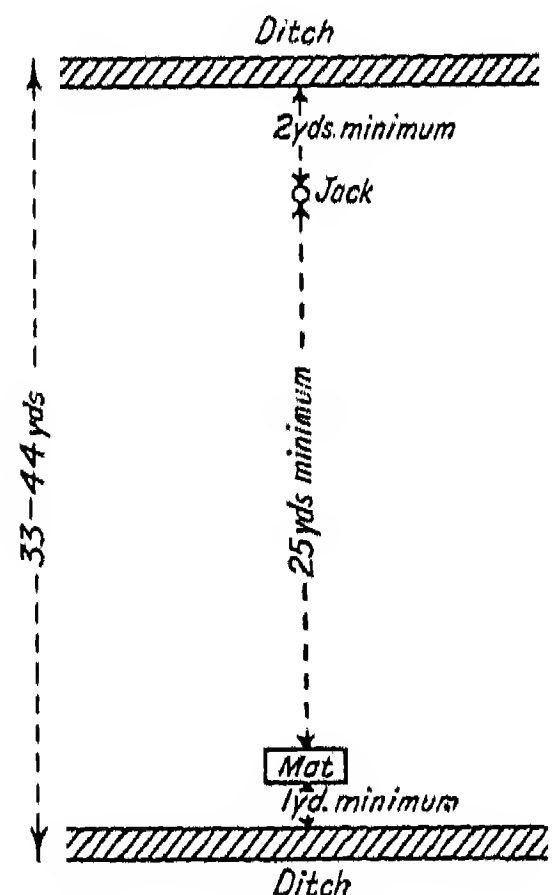
There are two types of game according to the type of green, i.e.

whether it is a level or a crown green. The level bowling green, a square or rectangle with sides from 33 yds. to 44 yds. long, so flat that a spirit-level reads true at any spot, is surrounded by a ditch 6 ins. deep and 15 ins. wide. The green is divided into rinks or playing spaces each not less than 19 ft. or more than 21 ft. wide. These dimensions admit of play in transverse directions in alternate weeks, so preserving the lawn.

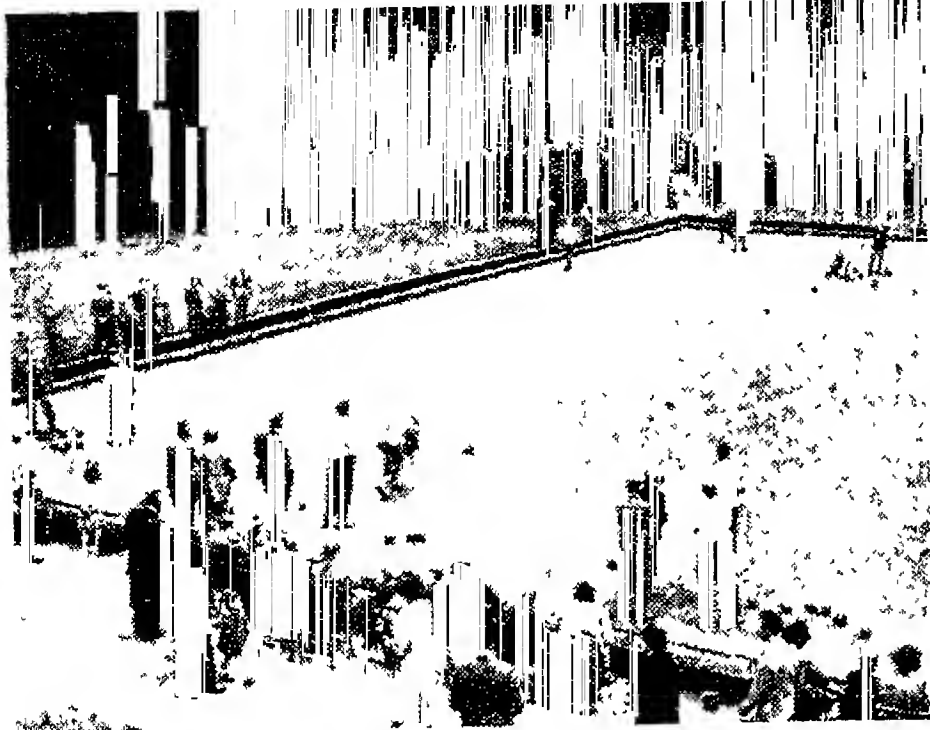
At one end of the rink an india-rubber mat (2 ft. by 1 ft. 2 ins.) is placed at the start of the game so that its rear edge is 1 yd. from the ditch behind (its position can be varied at a later stage in the game). A small white porcelain ball (the jack) is thrown up the green so that it comes to rest at least 2 yds. from the ditch and at least 25 yds. from the mat. When a player bowls his "wood" towards the jack he must have one foot on the mat.

The bowls are generally made of lignum vitae, the heavy wood of a West Indian tree (*Guaiacum officinale*), but composition bowls are sometimes used. A bowl must not exceed 16½ ins. in circumference or 3½ lb. in weight, and, for the level game, must have a bias, imparted to one side by the turner while the bowl is in the lathe, which shall make it draw at least 6 ft. to a 30-yd. jack on a dry green of undoubted quality. Players wear rubber-soled shoes.

The games commonly played are the single-handed (four bowls to each player); pairs (four bowls to each pair of players); triples (three players in each team, each playing three bowls); and, most usual, the four-a-side or rink (four players in each team, playing



Bowls. Diagram of a level green



Bowls. A game in progress at an East Molesey club

two bowls each). In singles a game consists of 21 points up, but in all others 21 ends must be played. Points are scored for all bowls nearer to the jack than the nearest bowl of the opponent (or opponents).

The principal shots in the game are: *drawing* (placing the bowl as near the jack as possible); *trailing* (carrying the jack with a bowler's wood into a more advantageous position); *guard* (blocking the path of an opponent's bowl); *follow on* (the bowler knocks a wood on beyond the jack while making his own bowl come close to the jack); *cannon* (when a bowler makes his bowl rebound from another); *yard on* (a straight hard throw to break up the "head," i.e. scatter bowls clustered round the jack). A game popular in Scotland consists of playing these and other shots individually and in turn.

The crown green game has its own code of laws and is played on a green 40 yds. square, with an all-round fall of about 12 ins. from the centre to the ditch. The bowls are of distinctly narrower bias than those used in the level green game. Each competitor throws in any direction he likes a wooden jack of similar bias to that of his bowls. Crown green bowls is played professionally in Lancashire, Yorkshire, and the W. Midlands, and is controlled by the Crown Green Association. Consult *The Complete Bowler*, J. A. Manson, 1919; *The History of the Game of Bowls*, E. J. Linney, 1933.

Bowra, Sir (Cecil) Maurice (b. 1898). British scholar. Born April 8, 1898, he was educated at Cheltenham College and New College, Oxford. Warden of Wadham College, Oxford, from 1938, he was professor of poetry at Oxford 1946-51, and vice-chancellor

1951-54. A commander of the legion of honour, he was knighted 1951. His erudition and fine critical appreciation were at their best in subjects dealing with classic literature, e.g. *Tradition and Design in the Iliad*, 1930; *Ancient Greek Literature*, 1935; *Greek Lyric Poetry*, 1936; *Sophoclean Tragedy*, 1944; *Problems in Greek Poetry*, 1954.

Bowral. Town and summer resort in Camden co., N.S.W., Australia. It is 82 m. by rly. S.W. of Sydney. At an alt. of 2,200 ft., it is the centre of an area chiefly agricultural and pastoral (dairying, fruit growing, sheep raising) where there is also some coalmining and quarrying of shale and road metals. Brewing is the town's main industry. Sir Donald Bradman started his cricket career here. Pop. (1954) 3,922.

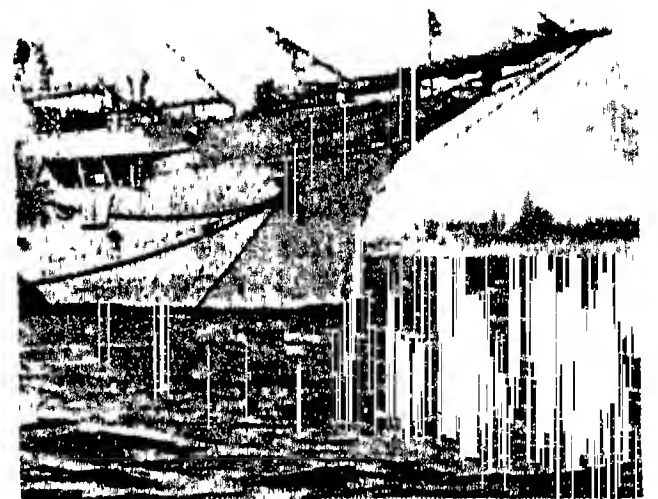
Bowsprit (A.S. *spreot*, pole). Spar which projects over the bows of a vessel. It is one of the main spars to which the head sails are affixed. A bob-stay fixed below it eases the upward strain which the top-mast fore-stay throws upon the bowsprit.

Bow Street. London thoroughfare, between Russell Street and Long Acre, W.C.2. Its police court, the chief police court of the metropolis, built 1881, replaced a court first established in 1748 at which the novelist Henry Fielding presided 1748-54. In 1780 it was destroyed by the Gordon Rioters; rebuilt on the same site, it was moved in 1825; the Bow Street runners served writs and acted as detectives until 1829. In 1920 the police court and station were bought for the metropolitan police for £25,000. A museum for police relics was opened in 1949.

Adjoining the floral hall, part of Covent Garden market giving on to Bow Street, is The Royal Opera House, Covent Garden. On the E. side, about the middle of the street, once stood the Cock Tavern, introduced by Wycherley in *The Plain Dealer*.

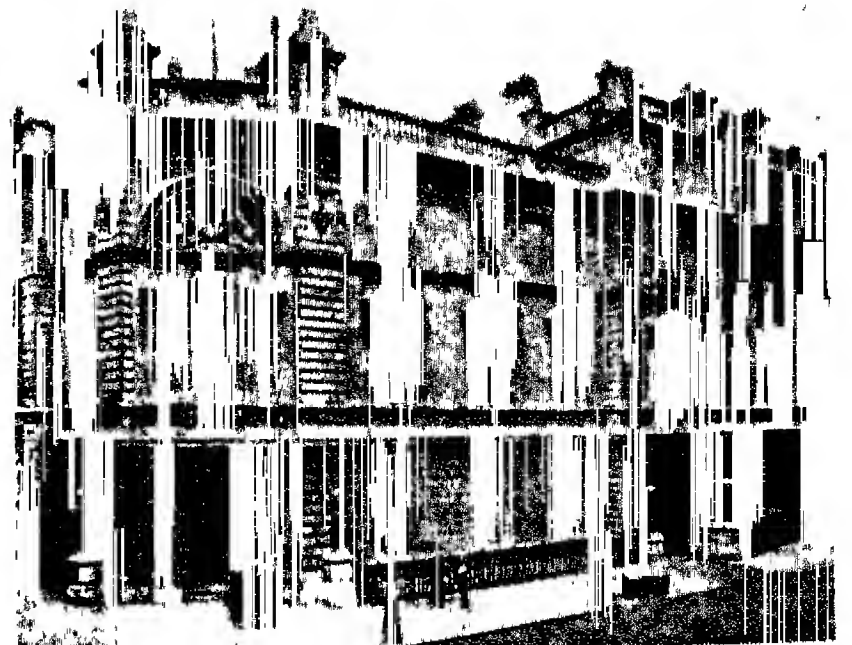
Notable residents of Bow Street have included Grinling Gibbons, Garrick, Peg Woffington, Dr. Johnson, Dr. John Radcliffe, Edmund Waller, and Jacob Tonson. At the N.W. corner of Russell Street, which runs out of it, stood Will's Coffee House. Button's and Tom's were other well-known coffee-houses in Bow Street; in Russell Street stood Tom Davies's bookshop where Boswell first met Johnson.

Bowstring. String joining the two ends of a bow stave and holding it in tension. Bowstrings are made of hemp and other fibres, raw hide, and various other materials. In modern British archery the bowstring consists of three strands of hemp compacted with glue. In India bowstrings were often made of loose threads of silk tied at intervals.



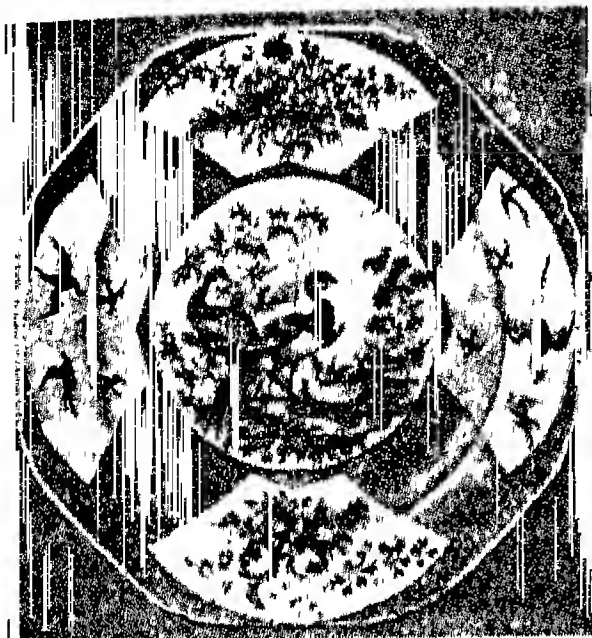
Bowsprit. Spar over a ship's bows

Bowstring Hemp. Fibre used for making cord and bowstrings. It is obtained from various species of the monocotyledonous genus *Sansevieria* (of the family Liliaceae), herbaceous perennials with a rosette of sword-like leaves which yield a strong elastic fibre. Important species of the genus occur in tropical Africa and Asia. Some have been cultivated in Central America.



Bow Street, London. The famous police court

Bow Ware. Earthenware formerly made at Bow, London. In 1744 a patent was obtained for producing a semi-porcelain in which American kaolin was used. The factory was closed in 1770. During that short period very heavy ware having a hard, compact body was produced, as well as cups and saucers of eggshell



Bow Ware. A painted plate of this London pottery

thinness. The pieces made were table services, large bowls, cane heads, snuff boxes, and bonbonnières, figures and groups characterised by holes at the back for candlestick branches. These were decorated with crimson, pale blue and yellow underglaze, and other colours with gold overglaze. Bow ware has a glassy head-glaze, which with age becomes iridescent and discoloured, frequently with brown stains. The anchor and crescent mark on some pieces often causes Bow to be labelled Worcester or Chelsea.

Bow Window. A bay window which is segmentally or elliptically curved in plan. Curved windows of this type are occasionally found in the early Renaissance in England, but did not become common until the late 18th century. They remained in fashion throughout the Regency period.

Bowyer, WILLIAM (1699–1777). English printer and scholar. Son of the foremost English printer of his day, he was born at Whitefriars, London, Dec. 19, 1699, and studied at S. John's College, Cambridge. As proof-reader, he worked on Dr. Wilkins's *Selden*. He succeeded his father in 1737, and printed for parliament and several learned societies. Known

as "the learned printer," he edited and amended many books issued by the Bowyer press, edited the Greek Testament, 1763, and wrote two essays on *The Origin of Printing* (1774). He died Nov. 18, 1777, and left £6,000 for old printers, a bequest still administered by the Stationers' Company. *Consult* *Literary Anecdotes of the 18th Century*, J. Nichols, 1812–15.

Bowyers' Company. London city livery company. It was incorporated in 1620. The hall, in Bowyers' Court, Cripplegate, was burnt in 1666. The company, makers of long and cross bows, was not incorporated until firearms had superseded the bow. The offices are 6 Broad Street Place, London, E.C.2.



Bowyers' Company arms

Box (*Buxus*). Hardy native shrub of the family Buxaceae. It is noted for the hardness of its wood when well grown, attains a height of 20 ft. in ordinary soil, but is of very slow growth, and is one of the principal trees used for topiary work. A dwarf variety, *B. suffruticosa*, is used as an edging for beds and borders in formal gardens. It should be planted in autumn or spring in trenches about 9 ins. deep, with the plants nearly touching each other, and the tops about 3 ins. above the soil. Care must be taken not to



Box. Foliage of this hardy shrub

damage box edgings with weed killers. See Boxwood.

Box (A.S., a small case with a cover). Case made of wood, metal, cardboard, or other substance, generally provided with a lid for cover. When designed for a specific purpose it has usually a descriptive prefix, e.g. ballot-box,

deed-box. The word is also used of the driver's seat on a coach or other vehicle, and in connexion with machinery, as of a chamber in which a valve works, a kind of bearing, and the upper part of a

pump-stock. Figuratively the word has come to be applied to enclosed seats in the auditorium of a theatre, and also to a small house, and more particularly to a house occupied seasonally for shooting, hunting, or fishing. A loose-box is a kind of stable.

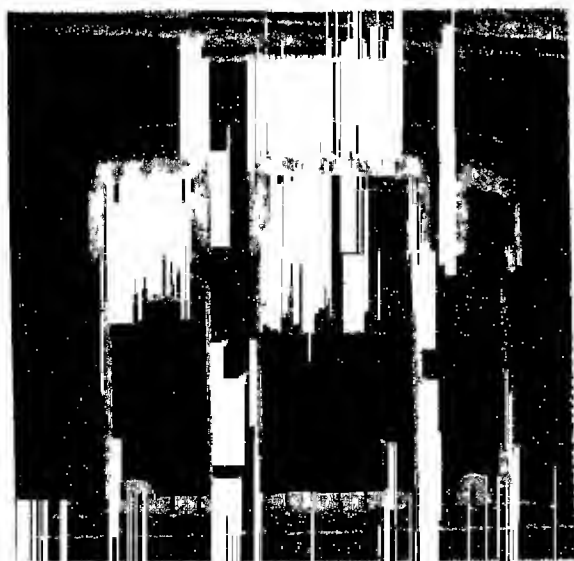
By the industry of box-making is usually meant the manufacture of cardboard boxes. That of wooden boxes is a branch of carpentry and that of leather boxes, more usually called trunks, is a branch of the leather trade. The industry is a subsidiary one, as it springs up in places where goods requiring cardboard boxes for packing are made, e.g. for the better classes of boots and shoes made in Northampton and elsewhere.

The products are divided into three classes: (1) rigid boxes, not only for the packing of general merchandise, but also for presentation and other non-commercial uses; (2) cartons delivered to the packers in folded form; (3) fibre-board packing-cases, which are the larger type of railway or shipping containers. As all these boxes, cartons, and cases are normally made to accommodate specific goods, there is a great variety in their material, construction, price, and size.

The industry employs a high proportion of female labour, and was one of those for which trade boards were at once established by the Act of 1910. It has expanded much in the 20th century. Minimum rates of wages operate under the provisions of the Paper Box Wages Council (Great Britain) Wages Regulation Order made by the ministry of Labour and National Service under the Wages Councils Act, 1945.

Boxall, SIR WILLIAM (1800–79). British painter. Born at Oxford, June 29, 1800, he entered the Royal Academy schools in 1819. After two years' study in Italy (1827–29), he returned to London, where he settled down as a portrait painter. Exhibiting in the Royal Academy in 1823, he was represented by some 86 portraits during his life. Elected R.A. in 1864, he succeeded Sir Charles Eastlake as director of the National Gallery in 1865, and was knighted in 1871. He died in London Dec. 6, 1879.

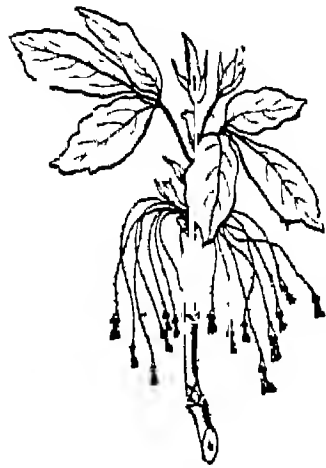
Box and Cox. Farce by John Maddison Morton, first produced at The Lyceum Theatre, London, Nov. 1, 1847. The fun is based on two lodgers renting the same room—the one a day worker and the other a night worker. Founded on



Bow Window. An example from White's Club, London, built in 1811
Campbell & Gray

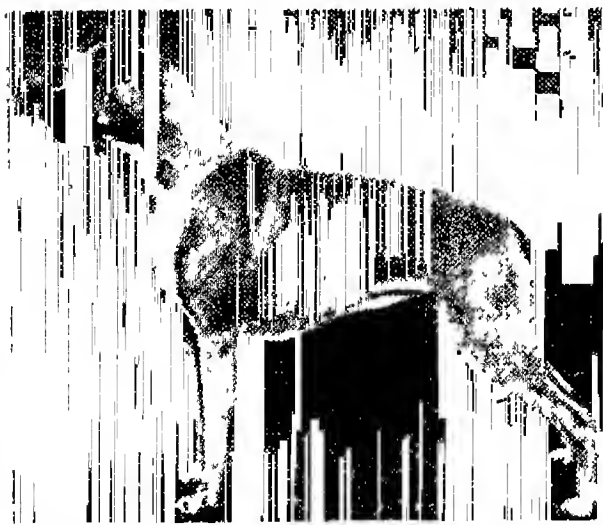
two French vaudevilles, it enjoyed great popularity and was translated into several European languages. A version by F. C. Burnand, with music by Arthur Sullivan, was produced in 1867 under the transposed title of Cox and Box.

Box Elder (*Negundo aceroides*). Tree of the family Aceraceae, sometimes classified as *Acer negundo*, a native of N. America, occasionally planted in Great Britain. It attains a height of 40 ft. The leaves are divided into three or five



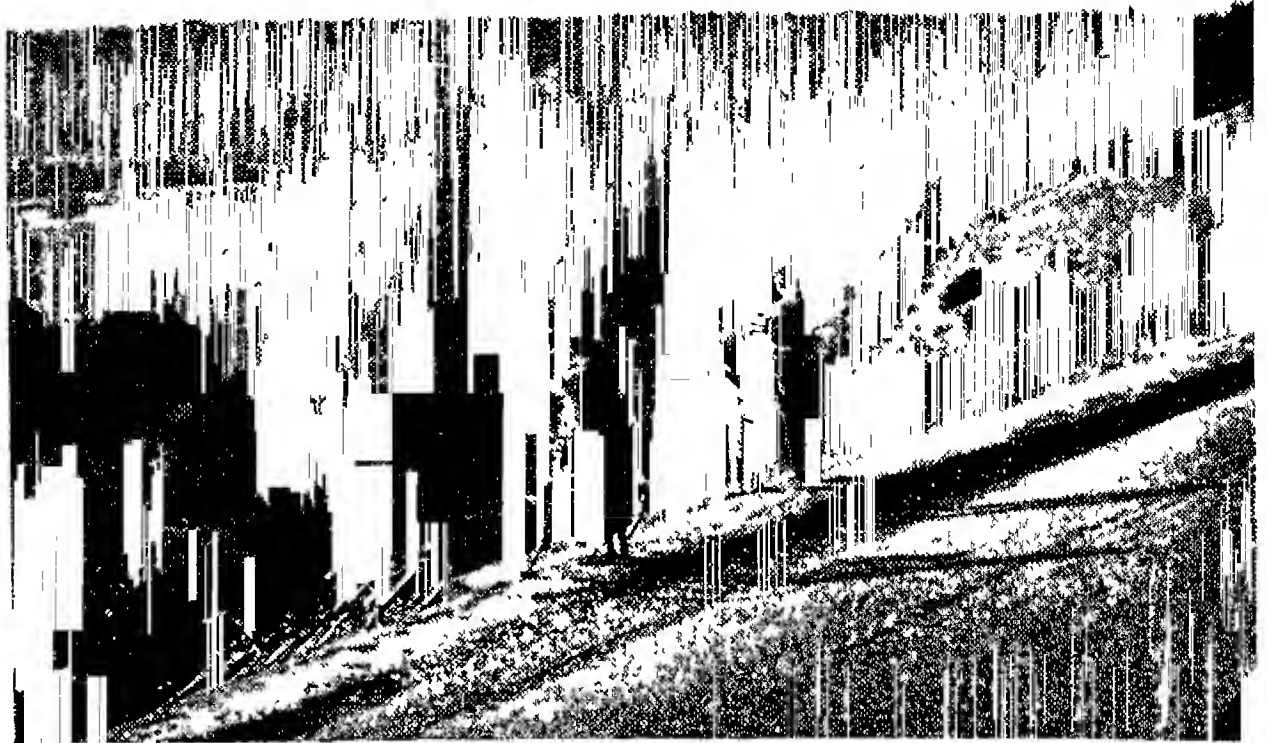
lance-shaped leaflets, whence it is called the ash-leaved maple. Its flowers and fruit are similar to those of the maples, to which it is closely allied.

Boxer. Breed that originated in Germany towards the end of the 19th century by a process of cross-breeding between various dogs of bulldog type, in which process a white English bulldog played a prominent part. First imported into England in 1932, the boxer gained many friends. After the Second Great War it became very popular, both in the show ring and as a pet. It is an exceptionally handsome dog of great character, a faithful and lovable companion, and an excellent and fearless guard.



Boxer. A champion specimen of the breed

It is of medium to large size, weighing 60-65 lb. and standing 21-24 ins. at the shoulder. Its build is muscular and powerful, but also elegant. The head is characteristic, with pronounced brow ridges ("stop"), and a deep broad muzzle with an undershot jaw. A black mask is essential. The coat is short and dense, in colour brindle, or fawn to dark red. Some white is permissible, but must not exceed one third of the ground colour.



Box Hill. A noted beauty spot of Surrey, England, in the North Downs

Boxers. The name given by Europeans to members of a society active in China at the turn of the 19th-20th centuries; its Chinese name meant "righteous harmony fist." More or less secret in its organization and aims, it professed a fervent nationalism, hatred of "foreign devils," and loyalty to the reigning dynasty. The empress dowager Tze-hsi, real ruler of China, ostensibly deprecated the activities of the Boxers, but the Chinese government secretly encouraged them, for the empress also wanted to expel all foreigners.

The Boxers rose in 1900 and marched on Peking. Troops sent to stop them fraternised with them. In many quarters missionaries and other foreigners were attacked; and on June 20 the German minister at Peking, Baron von Ketteler, was murdered while on his way, unarmed, to a meeting with the Chinese authorities. During June 20-July 16, when an armistice was proclaimed, the legations in Peking were besieged; 62 were killed.

A mixed European force of about 1,500 which had been put ashore at Tientsin on June 9 captured the Taku forts at the mouth of the Peiho r., June 17, and on June 30 captured and destroyed the arsenal at Tientsin. The allied troops entered Peking on Aug. 14, and on the 17th invaded the "forbidden city" (the sacred imperial palace) from which the empress had fled some time before to Sian, 600 m. to the S.W. In Sept. Chinese plenipotentiaries were appointed to discuss peace terms, which were agreed on Dec. 24. They included suitable punishment for those in authority who had allowed the outrages; payment of

indemnities; the Taku forts and others between Peking and the sea to be razed; and an imperial prince to convey to Berlin regrets for the murder of Baron von Ketteler. Consult *The Boxer Rebellion*, D. H. Clements, 1915.

Boxgrove. Parish and village of Sussex, England. It lies close to the Roman Stane Street, 4 m. N.E. of Chichester, on the border of Goodwood park. Ruins of a Benedictine priory stand near the church, which is Transitional and E.E., with remarkable roof paintings, carvings, and vaulting, an empty chantry designed for his tomb by Thomas West, earl de la Warr (d. 1532), and weird creatures on medieval tiles in the S. aisle. Pop. (1951) 764.

Box Hauling. Nautical term meaning bringing a close-hauled ship round to the other tack by throwing back her head sails so as to give her stern way, and putting the helm a-lee. Boxing off is throwing the vessel's head off from the wind.

Box Hill. Noted beauty spot of Surrey, England. The hill, a detached spur of the North Downs, 590 ft. high, is about a mile north of Dorking, and takes its name from the numerous box trees on its slopes. It commands an extensive view of the Sussex Weald and the South Downs.

In 1914 Leopold Salomons presented to the nation 230 acres of land here, including the summit; this property was vested in the National Trust and has been several times added to by gift and purchase. Below the hill are Burford Bridge, on the Mole, and the inn where Keats finished *Endymion*. Meredith lived at Flint Cottage, on the slope of the hill, from 1867, and died there in 1909; Juniper Bottom is his Happy Valley.

BOXING: PROFESSIONAL AND AMATEUR

Raymond Glendonning, B.B.C. Sports Commentator

An account of the history of the "noble art" as it has developed from the bare knuckle pugilism of the old prize ring. See also the biographical entries of the various champions: Corbett, Dempsey, Sayers, Sullivan, Wilde, and many others

Although it had its origin in the hand-to-hand encounters of ancient Greece, boxing as we know it today springs from the bare knuckle fights of the English prize ring. This era started with James Figg, who claimed the championship from 1719 to 1734, but it is his successor, Jack Broughton, champion 1734-50, who is known as the father of British boxing.

The old-time "mills" took place in the open on a grass area or wooden platform ringed off by ropes. There was a line or mark in the centre of the ring, termed the scratch, which each man had to toe, and a round was continued until one or other of the combatants was knocked down. Rounds were, therefore, of any length—from half-a-min. to half-an-hour. Two assistants, called respectively second and bottle holder, were allowed to each fighter, who rested upon the knee of one of them in the intervals between each round. The crowd was kept back by beaters, men drawn from the ranks of the prize fighters, who carried whips, and did not hesitate to apply them to the shoulders of any person who pressed too closely upon the ropes.

At his Amphitheatre in Oxford Street, Broughton did a great deal to establish the sport, including the drawing up of a code of rules in 1743 which remained in force for 95 years until in 1838 the "new rules of the ring" were brought out. The new rules, revised in 1853, prohibited brutal practices such as butting, gouging, and biting allowed by Broughton's code.

Eighteenth Century Boxing

Broughton was the first teacher to introduce gloves for practice bouts. The next great figure was Tom Johnson, champion 1783-91, his outstanding fight against Isaac Perrins lasting 65 rounds. Both Dan Mendoza and John "Gentleman" Jackson did much between 1788 and 1795 to develop the scientific side, Jackson with rooms in Bond St. being a great favourite with the young bloods of his day, despite the fact that he had comparatively few fights. Among his pupils was Lord Byron.

Early in the 19th century Tom Belcher and Tom Cribb were noted for "milling on the retreat." contemporary with them were Joe

Berks, Hen Pearce (known as the Game Chicken), John Gully, afterwards M.P. for Pontefract, and Jem Ward. Jem Burke, Ben Bendigo, and Benjamin Caunt were champions between 1830 and 1850. Probably most famous of old-time English pugilists was Tom Sayers, whose last fight was at Farnborough on April 17, 1860, when he met the American champion John Heenan in what is generally acknowledged to be the greatest battle of the prize ring. It was abandoned, after 37 rounds, as a draw, following police intervention. Sayers lived only five more years, and was buried in Highgate cemetery, where a monument was erected to his memory. The last important characters of the prize ring were Jem Mace, who died in 1911, Charlie Mitchell, Tom King, and Jem Smith.

Queensberry Rules

Resolute action by the authorities in stamping out the prize ring nearly brought about the end of the sport. The day was saved by the marquess of Queensberry, who introduced rules to cover amateur competitions which were brought within the law by reducing the fights to three time-limited rounds and by eliminating all ways of defeating one's adversary except by punching him whilst wearing certain sized gloves. The Queensberry rules for "contests of endurance" next emerged to govern professional contests, and though these were still outside the law, by limiting the rounds to twenty, promoters got near to legalising the professional game.

Mitchell and Mace were as good with gloves as without. Jake Kilrain, the American John L. Sullivan, and an Australian Frank Slavin were prominent in 1888. Towards the end of the 19th century Lord Lonsdale did much to clarify the legal position and to establish it on a sound basis. His memory is perpetuated by the Lonsdale belts. In 1881 the Amateur Boxing Association introduced rules with a points method of scoring, cards being kept by judges and referee. The man who scored the greater number of points for direct clean hits with the knuckle part of the glove on the specified target and for defensive measures such as guarding,

slipping, ducking, and countering was declared the winner.

The best of the Queensberry endurance contest rules, plus the best of the A.B.A. rules, later constituted the National Sporting Club rules which formed the basis of boxing rules all over the world and did much to legitimise the sport. The N.S.C., founded by John Fleming and A. F. "Peggy" Bettinson on March 5, 1891, held an unchallenged place in British boxing up to the start of the Second Great War. Famous boxers such as "Peerless" Jim Driscoll, Jimmy Wilde, Billy Wells, Kid Lewis, Sam Langford, Tommy Burns, Carpentier, Owen Moran, Johnny Basham, Johnny Summers, and Pedlar Palmer all appeared there.

The first International glove fight championship took place in San Francisco during 1891 when J. J. Corbett drew with a negro, Peter Jackson. Corbett became first recognized world champion in 1892 when he beat Sullivan over 21 rounds in New Orleans.

Holders of the heavyweight title afterwards were Bob Fitzsimons (his birth certificate spelt his name with only one m), James J. Jeffries (1889-1904), Tommy Burns, Jack Johnson, Georges Carpentier (white champion only), Jesse Willard, Jack Dempsey, Gene Tunney, Max Schmeling, Jack Sharkey, Primo Carnera, Max Baer, J. J. Braddock, and Joe Louis, who between 1937 and 1946 successfully defended his title 22 times, knocking out 19 of his opponents. In Aug., 1937, the Welshman Tommy Farr, then British heavyweight champion, went the full 15 rounds with him only to lose on points.

Great Britain has always produced world flyweight champions, including the "Mighty Welsh Atom" Jimmy Wilde, Jackie Brown, Peter Kano, and two Scotsmen, Benny Lynch and Jackie Paterson.

British Administration

Professional boxing in Great Britain is controlled by the British Boxing Board of Control—which consists of administrative stewards and stewards of appeal who have no financial interest in the sport—and by area councils composed of representatives of the various categories, i.e. promoters, boxers, referees, etc. All professional boxing is under National Sporting Club rules as recognized by the board, and takes place in a roped ring of not less than 14 ft. or more than 20 ft. sq. In all contests the num-

ber of rounds must be specified, 15 rounds being the maximum allowed. No round exceeds three minutes in duration, and the interval between the rounds is one minute. If one of the contesting parties is down, he must rise within ten seconds. A contestant failing to continue the contest after ten seconds is not awarded marks for that round, and the contest terminates. A man is considered down even when he is on one or both feet, if at the time any other part of his body is touching the ground, or if he is in the act of rising. Marks are awarded for both attack and defence; if the points accruing to each of the men at the end are equal, preference is given to the one who has done more leading and shown more initiative.

Powers of the Referee

The referee has absolute power in his interpretation of the rules, and if in his opinion either of the contestants is outclassed, and so liable to receive excessive punishment, he can stop the contest. He has power to disqualify a contestant for any irregularity, such as hitting below the belt or with the open glove, holding, butting, or any other act he may regard as foul according to the rules.

The minimum weight of the gloves is six oz. In contests of over ten rounds each contestant is allowed to have a maximum number of four seconds, including the promoter's official seconds, in his corner. The seconds leave the ring when time is called and give no advice or assistance to the contestants during the progress of any round. All championship contests, whether for world, British, British Empire, or area titles, are controlled and regulated by the B.B.B.C., which has the same relation to professional boxing as the Jockey Club to horse racing.

In all contests for British championships contestants must be legally British subjects and born of white parents. In British title contests the Lord Lonsdale challenge belts—first awarded in 1911—are at stake and any contestant who wins three times makes the belt his own property and qualifies for a pension of £1 a week for life upon reaching 50. In Commonwealth championships a trophy is awarded.

Amateur Boxing

Boxing is a popular sport in boys' clubs and in the services. Amateurs box under Amateur Boxing Association rules or those of the

Imperial Services Boxing Association, or the Fédération Internationale de Boxe Amateur, the set of rules of the latter governing Olympic contests. The Amateur Boxing Association, first formed in 1880, has flourished and exercises strict but benevolent control over hundreds of clubs with many thousands of members. The amateur championships, held annually, always attract a capacity attendance.

Standard weights throughout the world are, for professionals:

Flyweight	up to 8 stone
Bantam	up to 8 st. 6 lb.
Feather	up to 9 stone
Lightweight	up to 9 st. 9 lb.
Welter	up to 10 st. 7 lb.
Middle	up to 11 st. 6 lb.
Light heavy	up to 12 st. 7 lb.
Heavyweight	any weight over 12 st. 7 lb.

For amateurs:

Flyweight	up to 8 stone
Bantam	up to 8 st. 7 lb.
Feather	up to 9 stone
Lightweight	up to 9 st. 7 lb.
Light welter	up to 10 stone
Welter	up to 10 st. 9 lb.
Light middle	up to 11 st. 2 lb.
Middleweight	up to 11 st. 11 lb.
Light heavy	up to 12 st. 10 lb.
Heavyweight	any weight over 12 st. 10 lb.

Gloves for I.S.B.A., F.I.B.A., and A.B.A. (senior) contests must weigh eight oz. For juniors of seven stone and under, six oz. is the requisite weight.

BRITISH LAW. A boxing match with gloves is lawful if fairly conducted, and if a boxer is killed in such a match his opponent is not guilty of a crime; but if two persons fight, whether with gloves or not, with the intention of continuing until one of them gives in from exhaustion or injuries, the match is illegal, and if one of the fighters dies, the other is guilty of manslaughter.

Bibliography. Boxiana, P. Egan, 1818-21 and 1828-29; The Complete Amateur Boxer, Bohun Lynch, 1913; Scientific Boxing and Self-Defence, T. Burns, 1914; My Methods, G. Carpentier, English trans. 1914; Boxing for Beginners, H. M. Herman, 1936; Giants of the Ring, R. A. Haldane, 1950.

Boxing Day. In England the first week-day after Christmas Day, so called from the gratuities or presents given to servants on this day, the gratuities being at one time placed in boxes. The practice is probably a survival from the Roman Saturnalia. Boxing Day is a bank holiday in England, Wales, N. Ireland, and the Channel Islands. Dec. 26 is also the festival of S. Stephen.

Box Stones. Rounded pieces of ferruginous sandstone. The exteriors are hardened by infiltration of iron, while the inside is

much softer. They are found in a thin bed at the base of the E. Anglian Pliocene, the bed being composed of fragments of many older formations. The box stones, which contain casts of fossils, particularly of molluscs, which form a fauna unlike anything found elsewhere in Great Britain, have been variously referred as to age to the Oligocene, Miocene, and Lower Pliocene.

Boxtel. Town of the Netherlands, in North Brabant, 7 m. S. of 's Hertogenbosch. Its chief manufactures are paper, linen, and salt. Here the French defeated an Anglo-Dutch army, Sept. 17, 1794. Pop. (est.) 14,000.

Box Thorn (*Lycium barbarum*). Climbing shrub of the family Solanaceae. A native of N. Africa, it has smooth, lance-shaped leaves and small purple, funnel-shaped flowers yellowish at the base, succeeded by orange or scarlet fruits. It is often grown against cottage walls in England where it is called the tea-tree, from the former occasional use of its leaves as a substitute for those of *Thea sinensis*. From such situations it often escapes to neighbouring hedges and grows wild.

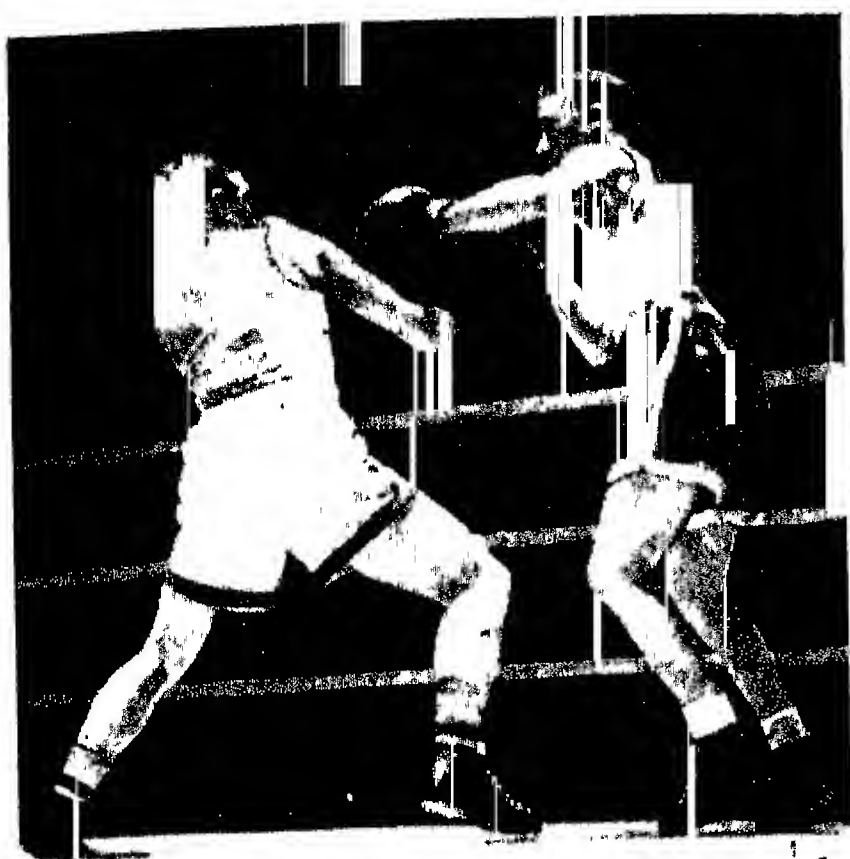


Box Thorn

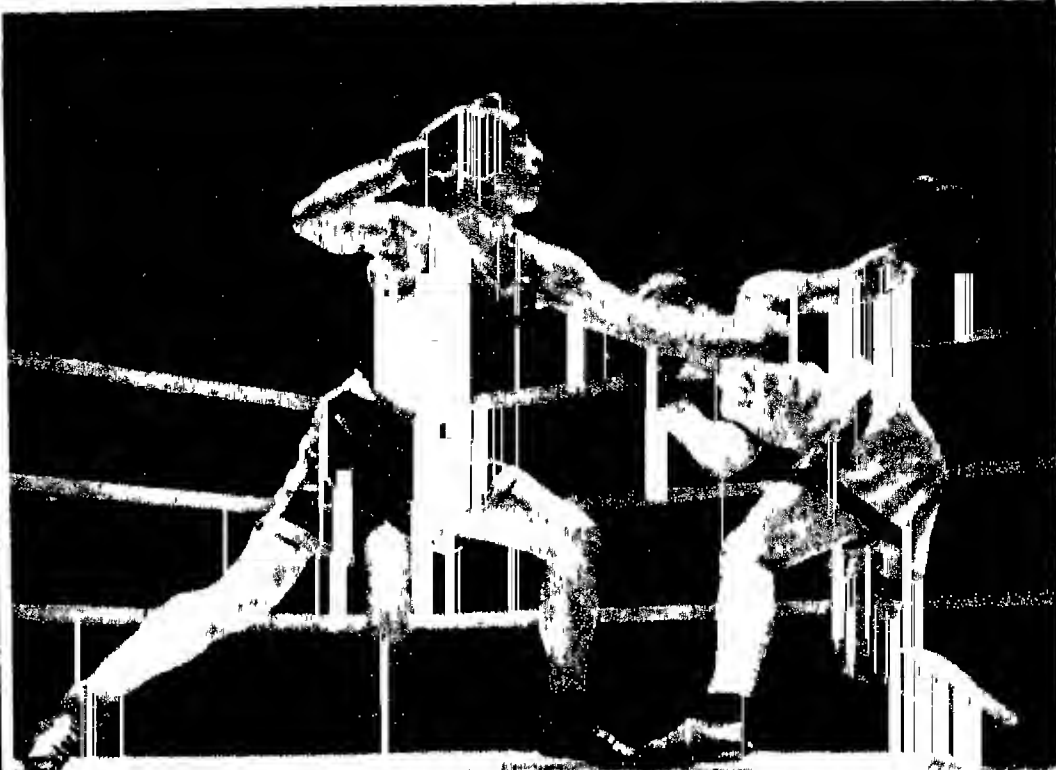
Boxwood. Wood of the box-tree (*Buxus sempervirens*). It is an evergreen tree of the family Buxaceae, a native of Europe, N. and W. Asia, and N. Africa. The wood has an exceedingly fine and close grain, rendering it hard and so heavy that it will not float in water. It is used for mathematical instrument making, and for wood engraving. Pliny mentions its use for turnery. The sawdust is used for polishing jewelry.

Boyacá. Department of E. Colombia. Separated from Venezuela by Arauca territory, it is mountainous in the W., and has vast prairies in the E. It produces coffee, cereals, cotton, coal, iron, copper, plumbago, and salt; fine emeralds are found at Muso; from its dense forests timber, resins, and balsams are obtained; and there is cattle-raising on the plains. There are pre-Colombian remains of the Chibcha culture. Area 24,944 sq. m. Pop. (1951) 801,436.

At the town of Boyacá, 22 m. S. of Tunja, capital of the dept., Bolívar defeated the Spanish forces, Aug. 7, 1819, thus securing the independence of Colombia.



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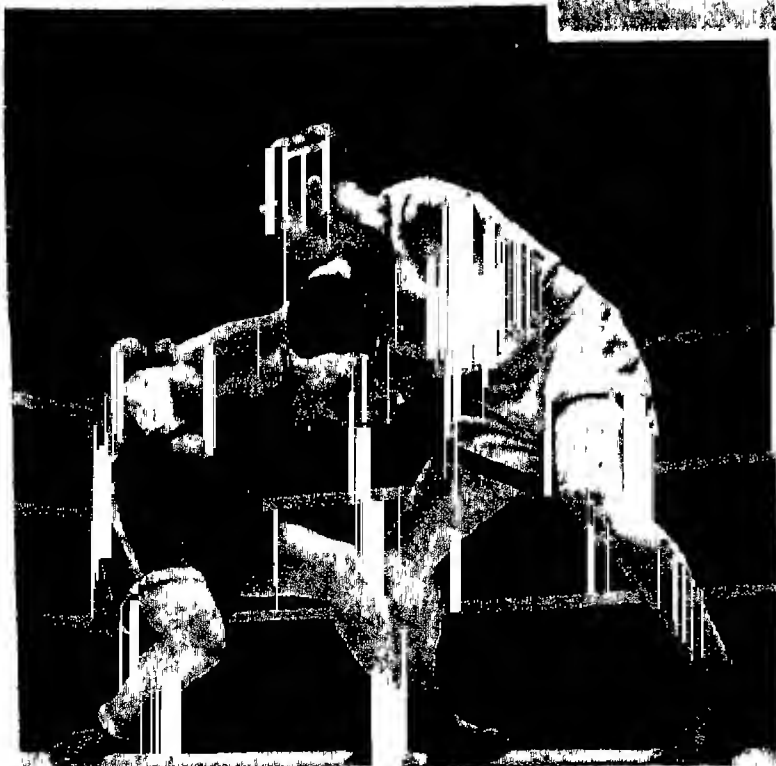
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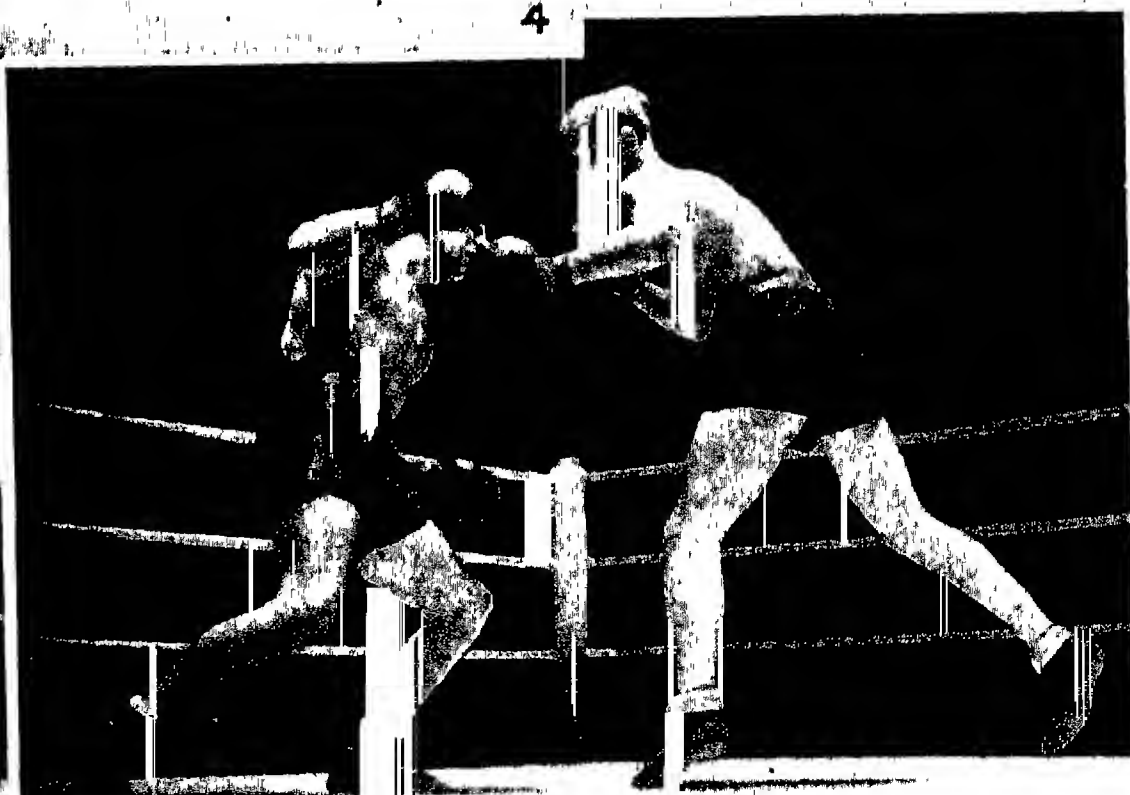
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These action pictures show that boxing demands not only physical fitness and agility, but a quick brain and a knowledge that comes only by practice. 1. The contestant on the right is bringing a left hook into play. 2. Clever dodging of a two-handed attack.

3. Attempting a right hook. 4. Through agility the man on the left has been able to deliver a body blow. 5. Boxers in a clinch, such as is speedily broken by the referee. 6. An example of artful ducking to avoid a right swing. 7. A successful left punch to the jaw

BOXING: TACTICS AND TELLING BLOWS OF THIS POPULAR SPORT

Boy Bishop OR BAIRN BISHOP (Lat. *episcopus puerorum*). Principal figure in certain church revels of the Middle Ages. They were forbidden by the council of Basel, in 1431. From Dec. 6. the festival of S. Nicholas, the patron-saint of children, till Holy Innocents' Day, Dec. 28, a boy, chosen from the choir of church, cathedral, or grammar school, was invested with the full insignia of a bishop, and, with companions dressed as priests, presided over the services in church. In England Salisbury was a chief centre of these revels, of which the Eton Montem, abandoned in 1847, is believed to have been a survival. A boy bishop said vespers before Edward I in 1299 at Heaton, near Newcastle. Henry VIII abolished the custom, restored 1554, again abolished by Elizabeth I. Appointment of a boy bishop was revived at S. Matthew's, Moorfields, Bristol, in 1942.

Boyce, WILLIAM (1710-79). British musician. Born in London, Feb. 7, 1710, he was educated at S. Paul's, and became a chorister in the cathedral. During 1734-68 he was organist at S. Peter's, Vere Street, and S. Michael's, Cornhill, and in 1737 was appointed conductor of the Three Choirs Festival. From 1736 he was composer to the Chapel Royal, and in 1758 became its organist. He edited a valuable collection of church music by English composers, published under the title Cathedral Music. His many compositions include an oratorio (Noah), eight symphonies, and the music for odes, masques, operettas, and Shakespeare's *Tempest*, *Cymbeline*, and *Winter's Tale*. He is best remembered for the song *Hearts of Oak*, written for Garrick's *Harlequin's Invasion*, 1759. He died Feb. 7, 1779.

Boycotting. Social and commercial isolation of an individual, or incitement thereto, with a view to influencing his conduct. The term is derived from Charles Cunningham Boycott (1832-97), land agent to Lord Erne, in Co. Mayo, Ireland. Having incurred the hostility of the Land League in 1880 by a number of evictions, he was made the victim of an organized conspiracy to prevent him from making any purchases, even of the necessities of life, from the people of the district, and from having any contact with them. The same tactics used by the Land League against others also led to the passing of the Crimes Act of 1887.

Boyd, ANDREW KENNEDY HUTCHISON (1825-99). Scottish essayist and divine. Born at Auchinleck

Manse, Ayrshire, Nov. 3, 1825, and educated at King's College, London,



A. K. H. Boyd,
Scottish divine
Elliott & Fry

and Glasgow university, he was ordained to the Presbyterian ministry in 1851, and from 1865 till his death was minister of St. Andrews. Boyd reached a wide public early in his career by writing articles in *Fraser's Magazine* over his initials, A. K. H. B. These essays, written in a lively, clear, and allusive style, were reprinted, 1859-78, as *Recreations of a Country Parson*. Boyd also wrote *Graver Thoughts and Critical Essays of a Country Parson*, 1862, and volumes of sermons and reminiscences. He died at Bournemouth, March 1, 1899.

Boyd, ZACHARY (c. 1585-1653). Scottish divine. He was educated at Glasgow, St. Andrews, and the Protestant college of Saumur, in France, residing at the last place some 16 years. Returning to Scotland in 1623, he became minister of Barony parish, Glasgow, and an influence in the university, which he served as dean of faculty, rector, and vice-chancellor. In his later years a *Covenanter*, Boyd preached before Cromwell in 1650, and from the cathedral pulpit "railed at him to his face." Boyd wrote numerous books of a devotional character, and attempted a metrical version of a large part of the Bible. He left his library to Glasgow university.

Boyd-Carpenter, SIR WILLIAM (1841-1918). British divine. The son of a clergyman, he was born in Liverpool, March 26, 1841, and educated there and at S. Catharine's College, Cambridge, where he graduated in 1864, and was ordained. His reputation as an eloquent



Wm. Boyd-Carpenter,
British divine
Russell

preacher was quickly made. During 1870-79 he was vicar of S. James's, Holloway, during 1879-84 of Christ Church, Lancaster Gate. Having attracted the notice of Queen Victoria, he was made canon of Windsor in 1882. In 1884 he was selected as bishop of Ripon, and remained there until 1911, when he exchanged the bishopric for a canonry at West-

minster, which post he retained until his death, Oct. 26, 1918.

He was created K.C.V.O. in 1912. His many published books include his *Hulsean and Bampton lectures* (delivered 1878 and 1887 respectively); *The Spiritual Message of Dante*, 1914; and two volumes of reminiscences.

Boydell, JOHN (1719-1804). British engraver. Born at Dorrington, Shropshire, Jan. 19, 1719, and apprenticed to the engraver Toms, in London, he made his debut with a number of books, each containing six landscapes, and issued over 4,000 plates. He was a city alderman in 1774, and lord mayor in 1791. About 1786 he initiated his great scheme for the illustration of Shakespeare by engravings after the works of eminent contemporary artists. This, thanks to his liberality, was a veritable endowment of English painting; 167 paintings by the best artists of the day and 3 pieces of sculpture composing his *Shakespearean Gallery* in 1802. Then financial difficulties obliged him to dispose of his property by lottery. He died Dec. 12, 1804, before the draw.

Boyd Orr, SIR JOHN BOYD ORR, BARON (b. 1880). British expert on nutrition. Born Sept. 23, 1880, in Ayrshire, he was educated at Glasgow university and took a medical degree. During the First Great War he served in the R.A.M.C., winning the D.S.O. He became a member of committees on fat stock, milk, and cattle for the ministry of Agriculture, and on nutrition for the ministry of Health. Director of the imperial bureau of animal nutrition, he was knighted in 1935. He was professor of agriculture at Aberdeen, 1942-45, and chancellor of Glasgow university, 1946. Independent M.P. for Scottish universities, 1945-46, he retired on becoming director-general of the United Nations food and agriculture organization, 1945-48. He was awarded the Nobel peace prize, 1949, in which year also he was created a baron. He published several studies concerning the connexion between food, health, and population growth.



Lord Boyd Orr,
British expert on
nutrition

Boyer ALEXIS, BARON DE (1757-1833). A French surgeon. Born at Uzerche, Corrèze, he was the son of a tailor. After studying

anatomy in Paris under Desault, he was appointed second surgeon at a leading hospital in 1794, and later to the chair of operative surgery at the school of health. He became surgeon to Napoleon in 1805, and later to Louis XVIII, Charles X, and Louis Philippe successively. He was made a baron in 1807, and a member of the academy of sciences in 1824. He died in Paris, Nov. 25, 1833. His best known works are *Traité Complet de l'Anatomie*, 1797-99, and *Traité des Maladies Chirurgicales*, 1814-26.

Boyer, JEAN PIERRE (1776-1850). President of the republic of Haiti. A mulatto born at Port-au-Prince, Feb. 28, 1776, and educated in Europe, he returned to Haiti, took part in the rising against the French in 1792, fought for the mulattoes against the negroes and for both against the British, when they invaded the island, and later fled to France, returning with French troops 1802.

The despotism of the negro Dessalines drove Boyer to join Christophe and Pétion against him. Dessalines was assassinated in 1806; when Christophe and Pétion divided the island between them, Boyer supported Pétion. He became governor of Port-au-Prince and when Pétion died in 1818 Boyer was elected president of the southern part of the island. On Christophe's death in 1820 he became ruler of the whole island. In 1827 he bought French recognition of the independent republic of Haiti, and for some years under Boyer's presidency the island had peace; but heavy taxation bred discontent which culminated in the insurrection of 1843. Boyer took refuge in Jamaica till 1848, when he sailed for France, where he died July 9, 1850.

Boyle. Market town of co. Roscommon, Irish Republic. On the river Boyle, it is 9 m. W. of Carrick-on-Shannon. It has ruins of a 12th-century Cistercian abbey and trades in dairy produce and provisions. Market days, Wed. and Sat. Pop. (1951) 1,934.

Boyle. Name of a famous Irish family, members of which have been or are earls of Cork, Orrery, Shannon, and Burlington. The first important member was Richard Boyle, made earl of Cork in 1620. Descended from an old Herefordshire family, he began the long connexion of the Boyles with Ireland. For his brother John he secured the bishoprics of Roscarberry, Cork, and Cloyne in 1617, and for a kinsman,

Michael Boyle, the bishopric of Waterford and Lismore in 1619. Another kinsman, Richard, was archbishop of Tuam, while a younger Michael (d. 1702) was archbishop of Dublin and then of Armagh. See Cork, Earl of; Orrery, Earl of.

Boyle, ROBERT (1627-91). Irish natural philosopher and chemist. Born at Lismore, Munster, Jan. 25,



Robert Boyle. Irish natural philosopher and chemist. From a painting after Frederic Kasseboom
National Portrait Gallery, London

1627, the 14th child of Richard Boyle, first earl of Cork, he was at Eton 1635-38, and for the next five years lived in France, Switzerland, and Italy. Boyle resided at Oxford during 1654-68. His bent for scientific investigation made him a leader in the foundation of the Royal Society. While at Oxford he conducted a long series of experiments on the spring (i.e. the elasticity) of the air, 1660, which threw entirely new light on the nature of the gaseous state and led to the discovery of the reciprocal relation between pressure and volume called after him Boyle's Law.

In *The Sceptical Chymist*, 1661, he criticised the age-old theories of the four elements (earth, air, fire, and water) and the three principles (salt, sulphur, and mercury); and substituted the suggestion that all matter was made out of combinations, in various proportions, of a number of substances which could not be broken down into simpler substances by any chemical means.

During his residence at Oxford, Boyle bore the expense of translating the Bible for Indian, Irish and Welsh readers, and into Turkish and Malay, in addition to Grotius's *Truth of the Christian Religion* into Arabic. By bequest he founded the Boyle Lectures for the defence of Christianity against attacks. Boyle's contributions to the Proceedings of the Royal

Society were extensive, but he declined the honour of its presidency, as he declined ordination and the provostship of Eton. He died in London, Dec. 30, 1691, and was buried at St. Martin-in-the-Fields. His complete Works, in four volumes, with a Life by Dr. Thomas Birch, were published in 1744.

Boyle Lectures. Courses of lectures, founded in 1691 by Robert Boyle, whose will provided £50 a year for the purpose. The lectures, delivered every year at a church nominated by the bishop of London, consist of a series of eight sermons to prove the truth of the Christian religion against atheism, paganism, Judaism, Mahomedanism, and deism. The controversies among Christians are expressly excluded. The lectureship is usually tenable for three years.

Boyle's Law. That the volume of a given mass of gas at a fixed temperature multiplied by the pressure is always a constant quantity. It was enunciated by Robert Boyle as the result of his study of the elasticity of gases. On the Continent it is generally known as Mariotte's Law. If V is the volume of the mass of the gas, and P is the pressure to which it is subjected, then Boyle's Law states that so long as the temperature remains the same, $PV = \text{Constant}$. Boyle experimented only with quantities of gases, beginning his investigations with a U-shaped tube with one end closed, into which mercury was poured; and his apparatus was not sufficiently accurate to determine small deviations from the law, even if in his limited experiments such had occurred. Regnault in 1847 examined the law with much improved apparatus; Amagat and others have continued experiments with much higher pressures. It has been found that gases deviate from the law slightly but consistently at high pressures and at low pressures.

Boylesve, RENÉ (1867-1926). French novelist. He was born at La Haye-Descartes, Indre-et-Loire, April 14, 1867, and educated at Poitiers and Tours. His real name was René Marie Auguste Tardiveau. In 1896 he published *Le Médecin des Dames de Néans*, and *Les Bains de Bade*; these were followed in rapid succession by other novels and short stories, in which he displayed acute observation of middle-class country life. He was made a member of the French Academy, March 20, 1919.

His voluminous works of fiction include *Sainte Marie des Fleurs*, 1897; *Le Parfum des Îles Borromées*, 1898; *Le Bel Avenir*, 1905; *La Poudre aux Yeux*, 1909; and *Tu n'es plus Rien*, 1917. He died Jan. 15, 1926.

Boyne. River of Ireland. Rising in the Bog of Allen in co. Kildare, it flows for c. 80 m., mainly N.E., to the Irish Sea, 4 m. below Drogheda, to which town it is navigable. On its banks are Trim and Navan. Its chief tributary is the Blackwater. Above Drogheda is the site of the battle of the Boyne.

Boyne, BATTLE OF THE. Fought between William III of England and the exiled James II, July 1 (July 11, new style), 1690. It resulted in the complete defeat of James and put an end to his hopes of restoration.

Having fled from England, James secured military and financial aid from Louis XIV of France, and betook himself to Ireland, where his supporters were numerous. To crush him William was obliged to cross over to Ireland in person, and landing with some troops at Carrickfergus he collected others from Londonderry and elsewhere and marched south. His army was about 36,000 strong. Meanwhile, the numerically inferior French and Irish were in

positions on the south side of the Boyne, near Drogheda.

William opened the attack by sending a force to cross the river by a bridge some miles higher up and so to turn the Irish left wing. This was done, and when the English were approaching the road to Dublin the French turned to oppose them, Lauzun being in command. William then sent his cavalry across the river nearer Drogheda, and here was the fiercest fighting of the day. The Irish foot soon fled in disorder, but the horsemen contested the advance, and Schomberg, William's most trusted lieutenant, was killed. The king himself came up and the enemy were routed. The losses were about 500 English and about 1,500 on the other side. An obelisk, approx. 2 m. west of Drogheda, marks the site of the battle, of which there is a vivid description in Macaulay's *History of England*. The papacy, which at that time was opposed to the policy of Louis XIV, expressed its satisfaction at the result of the battle. Orangemen of Ireland celebrate both the victories of the Boyne and of Aughrim (July 12, 1691, O.S.) on July 12.

Boys' Brigade, THE. Organization for the training and welfare of boys. It was founded in Glasgow, Oct. 4, 1883, by William

(later Sir William) Smith. With two colleagues he banded together some thirty lads as The Boys' Brigade, and under his guidance the movement grew enormously. Sir William Smith remained secretary until his death, May 10, 1914.

The brigade has a pronounced religious basis. It aims at training a boy to become a self-reliant God-fearing man. Companies are formed in connexion with churches, chapels, and other Christian organizations, providing a means by which boys at a critical period of their lives can be aided and ultimately led into membership of the churches. The strength of the brigade throughout the world was, in 1955, 3,380 companies, with 125,000 members. In addition the junior movement—the Life Boys—had 2,730 teams with 75,000 leaders and boys. In 1926 the union of the Boys' Brigade and the Boys' Life Brigade was effected. The headquarters are at Abbey House, Westminster, and 168, Bath Street, Glasgow.

Boy Scouts. World-wide organization for the development of citizenship among boys. In 1907, Gen. Sir R. (later Lord) Baden-Powell (*q.v.*) held a camp for boys on Brownsea Island, Poole harbour, to try out a scheme he called "Scouting for Boys." Boys were



Battle of the Boyne. William of Orange emerging from the river at the head of his English cavalry. The lifeless body of Schomberg, his trusted lieutenant, is in the arms of his soldiers

From the painting by Benjamin West, P.R.A.

drawn from all classes. In 1908 Baden-Powell published a book of the same name and boys all over Britain started troops. Then the Boy Scouts Association was founded, 1910, and expanded rapidly. In 1912 it was granted a royal charter of incorporation. The movement spread to other countries; and 45 years after its foundation its membership, in some 60 countries, exceeded 5½ million.

When he joins, a boy promises on his honour "to do his duty to God and the King (Queen), to help other people at all times, and to obey the scout laws." There are ten laws: 1. a scout's honour is to be trusted; 2. a scout is loyal to the King (Queen), his country, his scouters, his parents, his employers, and to those under him; 3. a scout's duty is to be useful, and to help others; 4. a scout is a friend to all, and a brother to every other scout, no matter to what country, class or creed the other may belong; 5. a scout is courteous; 6. a scout is a friend to animals; 7. a scout obeys orders of his parents, patrol leader, or scoutmaster without question; 8. a scout smiles and whistles under all difficulties; 9. a scout is thrifty; 10. a scout is clean in thought, word, and deed.

A boy can join the movement at eight years of age by becoming a wolf cub. He is awarded his tenderpad badge when he has passed the following tests:—he should know the cub law and promise, the salute, the grand howl, and their meanings. After investiture as a tenderpad, the cub proceeds to qualify as a one-star cub and afterwards as a two-star cub by passing tests. A star cub may gain proficiency badges in a number of subjects grouped under character training, handicraft, service, and physical health. The activities of wolf cubs are in keeping with the psychological needs of their age and are set in the imaginative framework of the Mowgli stories from Kipling's Jungle Books. The boy becomes a scout at 11 and his training is in three principal stages, tenderfoot, second class, and first class, covering first aid, signalling, observation, pioneering, mapping, swim-



Boy Scouts. British boy scout, sea scout, and air scout, giving the Scout salute

ming, estimation, camping. The culminating test for the first class badge is a journey of at least 14 m. in 24 hrs. The scout has a choice of 76 proficiency badges which, like those of the wolf cubs, are grouped: public service, hobbies, and outdoor activities.

Sea scouts and air scouts have the same basic training but with additional specialised activities.

At 18, the youth may become a rover scout. The practical activities of rover scouts are a development of those of the boy scouts, but with a more strenuous standard, hiking, climbing, pioneering, and so on; their theoretical training is based on the needs of citizenship with particular emphasis on personal responsibility as a member of the community. The complete scout

group comprises a wolf-cub pack, a scout troop, and a rover crew.

The organization in Great Britain is decentralised, each county and district being under its own commissioner. The centre of scouting in the British Commonwealth is the Imperial H.Q., Buckingham Palace Road, London.

Chile was the first foreign country to adopt the movement, in 1909, followed by France, the Scandinavian countries, and the U.S.A. in 1910. Exchange of visits between scouts of one country and another began about 1912. The first international jamboree was held in London in 1920; 27 countries were represented. As a result, the Boy

Scouts International Bureau was founded. The International Conference meets every two years and each country is entitled to send six delegates.

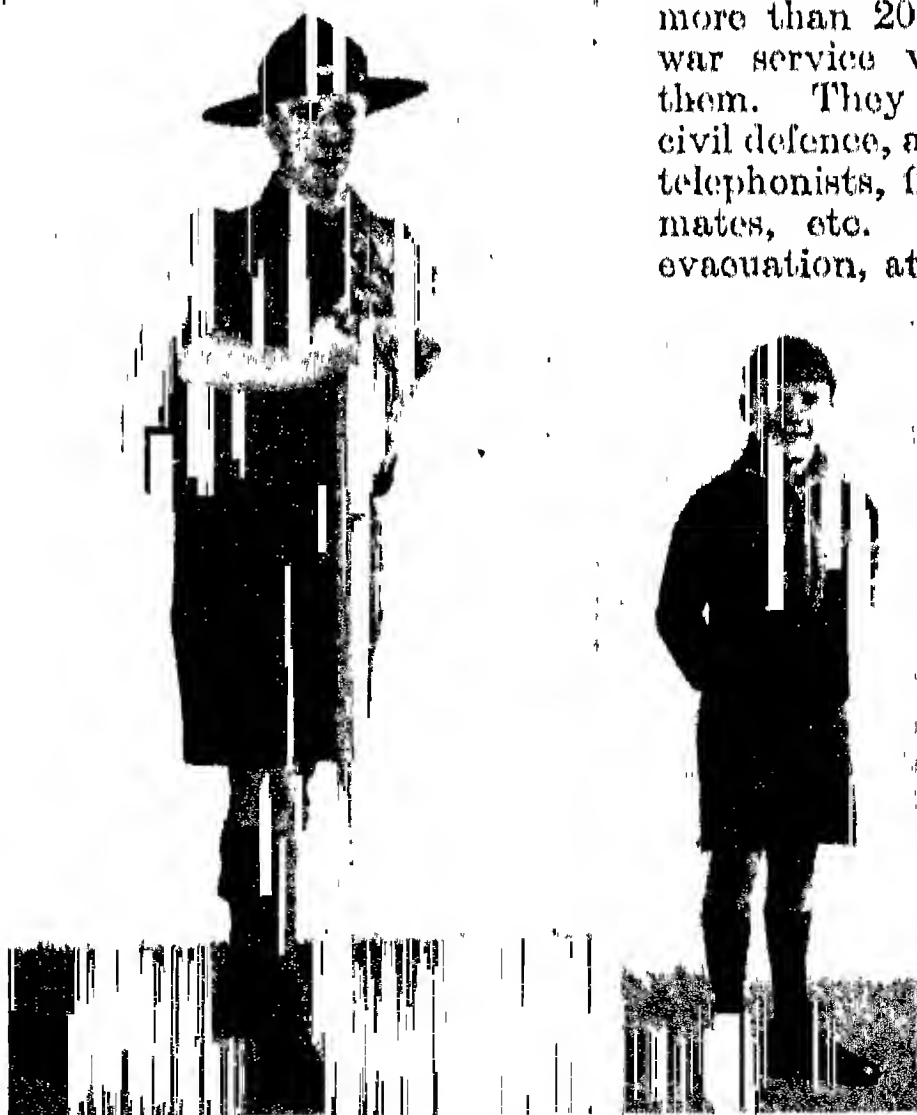
World jamborees and world rover moots are normally held at 4-yearly intervals.

Throughout both Great Wars, British boy scouts distinguished themselves by their service. In 1914-18 they were mobilised to protect railway bridges, waterworks, telegraphs, and cable lines—sea scouts did special duty as coastwatchmen—and in 1939-45 more than 200 different kinds of war service were carried out by them. They were prominent in civil defence, acting as messengers, telephonists, first aiders, wardens' mates, etc. They helped with evacuation, at rest centres, and in

air raid shelters. Many thousands of indoor air raid shelters were erected by them and they did salvage work, herb collecting, fruit picking, harvesting, and forestry. Volunteer teams of scout-trained men and women served in the Scout International Relief Service whose teams operated in Europe and the Near East. Tens of thousands served in the forces; of decorations, 11



Boy Scouts. Official badge, worn on Patrol Leader's hat



Boy Scouts. Left, rover scout; trained scouts can enter this group at the age of 18. Right, wolf cub

and 23 scouts were awarded the V.C. in the First and Second Great War respectively. In every country occupied by the Germans the movement was banned, but the scouts carried on "underground." Consult *Scouting for Boys*, R. Baden-Powell, 1908; *The Scout Movement*, E. E. Reynolds, 1950.

Boysen Dam. Earth dam on the Big Horn river, Wyoming, U.S.A., constructed during 1946-52 to provide irrigation, flood control, and power. It is 221 ft. high and 1,150 ft. long, and has a volume of 1,689,000 cubic yards.

Boz. Early pen-name of Charles Dickens, used on the title pages of all his books up to 1844, i.e. from *Sketches by Boz* to *Martin Chuzzlewit*. It had been the family nickname of his youngest brother, and was originally pronounced with a long o.

Bozen. German form of the name of the city of Bolzano (*q.v.*).

Bozrah. Name of two towns in ancient Palestine. (1) Bozrah of Edom (Gen. 36, v. 33) was the capital of the kingdom of the Nabateans, which flourished 100 B.C. to A.D. 100. It lay 30 m. S. of the Dead Sea.

(2) Bozrah of Moab (Jer. 48, v. 24) was situated in the Mishor, or plains of Moab, but its site has not been located with certainty. It may be the same as Bezer (Deut. 4, v. 43) in the territory of Reuben. Others have identified it with the Bosora of 1 Macc. 5, v. 26, called Bostra in Roman times, a city some 80 m. S. of Damascus.

Bra. Town of Italy. In the prov. of Cuneo, 31 m. by rly. S. of Turin, it trades in leather, chemicals, wine, cattle, and truffles. Pop. (1951) 19,087. Near by are the ruins of Pollentia (*q.v.*).

Brabançonne. LA. National anthem of Belgium. It was written to celebrate the rising of the southern Netherlands in 1830 against King William I of the Netherlands. The words are by Jenneval, music by Campenhout.

Brabant. Name of a duchy virtually independent in medieval times. Brabant early formed part of Lorraine, which about 1100 was divided into two parts, and it was Henry, duke of Lower Lorraine, who, about 1190, called himself duke of Brabant. He was also count of Louvain, his duchy being the district around that city, which was his capital until supplanted by Brussels. It also included Brussels and Antwerp. A later duke named John gave to his subjects the famous charter of liberties called *La Joyeuse Entrée* (*q.v.*).

This grant was made to celebrate the marriage of his daughter Johanna with Wenceslaus of Luxemburg. Johanna became ruler of Brabant on her father's death in 1355, and her marriage was the beginning of the end of the duchy's independence. Wenceslaus and Louis, count of Flanders, the husband of Johanna's sister, fought

In 1815 Brabant was included in the new kingdom of all the Netherlands, the two portions being again united, but the southern Netherlands rebelled in 1830. The kingdom of Belgium was recognized in 1839, and Brabant was once more divided, into North Brabant prov., the Netherlands, and Brabant prov., Belgium.



La Brabançonne. Words and music of the first verse of the National Anthem of Belgium, written by Jenneval, set to the triumphant tune composed by Campenhout

for Brabant for some years, Wenceslaus eventually obtaining possession. His widow chose as her successor her niece, Margaret, wife of Philip the Bold, duke of Burgundy, and when she died in 1406 Brabant passed to Philip's younger son, Anthony. His descendants died out in 1430, and the duchy was united with Burgundy.

As part of Burgundy Brabant came with the lands of Mary, the heiress of Charles the Bold, to the house of Hapsburg. In this way it was included in the possessions of Charles V and passed to Philip II of Spain. The revolt of the Netherlands against Spanish rule caused the separation of Brabant into two parts. The northern portion was conquered by the Dutch and was formally included in the United Provinces in 1648. The southern, now Belgian Brabant, remained under Spanish rule until 1713, when, on the partition of the Spanish realm, it passed to Austria.

Brabant. Prov. of Belgium, between the Scheldt and the Meuse. A very fertile region, it is Belgium's most densely populated prov. (more than 1,400 to the sq. m.). Its manufactures include lace, carpets, linen, hats, paper, chemicals, and pottery. Brussels is the capital. Area 1,267 sq. m. Pop. (1947) 1,798,468.

Brabant, NORTH. Prov. of the Netherlands. Bounded S. by Belgium and W. by Zeeland, it produces grain, beet, hops, and cattle; there are also tanneries. 's Hertogenbosch is the capital. Area 1,921 sq. m. Pop. (1954) 1,332,033.

Brabant. Town of France. In the dept. of Meuse, it is on the river Meuse, 10 m. N.N.W. of Verdun. Captured by the Germans in the battle of Verdun, Feb. 23, 1916, it was recaptured by the First American Army and part of the Second French Army, Oct. 8, 1918. See Verdun, Battles of.

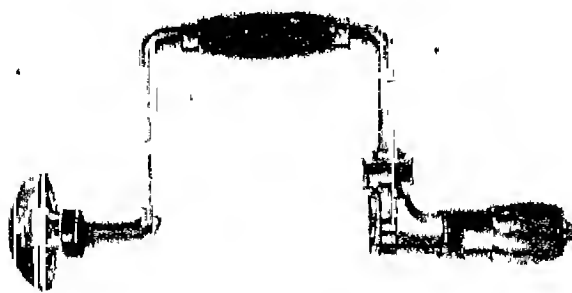
Brabazon. Name of two experimental air liners designed for the British ministry of Supply on the recommendation of a committee set up in 1942 under the chairmanship of Lord Brabazon of Tara. The Brabazon I was begun in 1945 and made its first test flight in 1949. Weighing 130 tons, it was 177 ft. long with a wing span of 230 ft. and was designed to accommodate 100 passengers. It was powered by eight paired Centaurus piston-engines developing a total of 20,000 h.p. Cruising speed was 225 m.p.h. and range 3,500 m. Only the fuselage of the Brabazon II, which was to be similar in dimensions but powered by eight paired turbo-propeller engines, was built. Total cost of the project, including a 3,000-yd. runway and an assembly hangar at Filton, Bristol, was £12,500,000. The Brabazon I proved too costly to operate and too large for existing airports. In 1953 both aircraft were sold for scrap.

Brabazon of Tara, JOHN THEODORE CUTHBERT MOORE-BRABAZON, 1ST BARON (b. 1884). British airman, holder of the first aviator's certificate issued by the Royal Aero Club in 1910. Born Feb. 8, 1884, and educated at Harrow and Trinity College, Cambridge, he was a pioneer motorist as well as airman. Brabazon served in the First Great War, becoming a lieut.-col., and had charge of the Royal Flying Corps photographic section. He was Unionist M.P. for the Chatham division of Rochester 1918-29, and for Wallasey 1931-42. Minister of Transport in 1940, minister of Aircraft Production 1941-42, he was raised to the peerage in 1942 and was made chairman of a committee to advise on Great Britain's post-war civil aircraft. He published his autobiography in 1956.

Brač. See Brazza.

Bracciano (anc. Lacus Sabatinus). Crater lake of central Italy, 18 m. N.W. of Rome. About 20 m. in circumference, it lies 535 ft. above sea level, is 525 ft. deep, and famous for its fish.

Brace. (Lat. *brachia*, arms). Name of a tool used by the carpenter and engineer for boring in wood or drilling in metal. The carpenter's brace is a steel crank, having at the top a wooden pad by which pressure is applied and at the bottom an adjustable chuck to take various boring bits. In the better tools the pad works on ball bearings, and the chuck is furnished with a ratchet device permitting rotation either clockwise



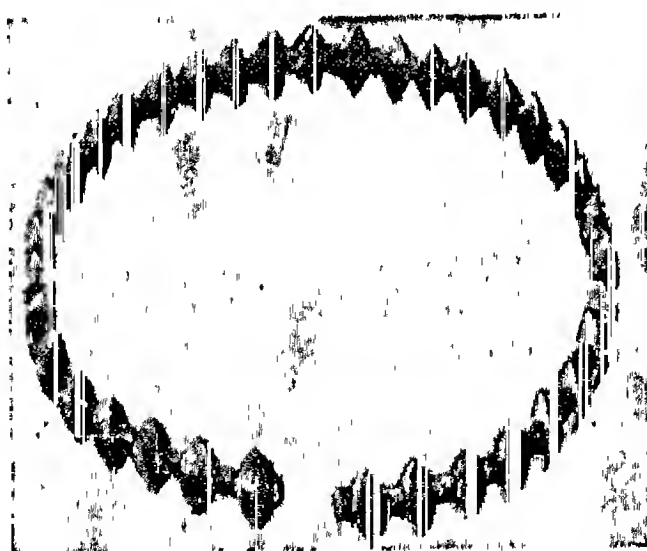
Brace. Carpenter's tool, used with a bit, for boring

or anti-clockwise—the latter for withdrawing the tool or for using a screwdriver-bit when taking out screws. The engineer's brace has no crank, and is supported in a drilling pillar or a cramping device by which pressure is applied; rotation of the drill (held in a chuck) is by means of a horizontal level which actuates a ratchet-drive on the brace spindle. See Bit; Boring; Drill.

The term is also used in carpentry for a piece of wood or metal strengthening or binding together the timbers of a roof. As a nautical term it signifies on sailing vessels the rope which is made fast to the yard when sails are trimmed.

Bracebridge Hall. Volume of stories and sketches by Washington Irving, published in 1822. It describes the life of an old-fashioned English countryside.

Bracegirdle, ANNE (c. 1663-1748). English actress. In 1688 she took the part of Lucia in Shadwell's *The Squire of Alsatia*, and in 1693 that of Araminta in Congreve's *The Old Bachelor*. When Betterton opened the theatre in Lincoln's Inn Fields in 1695, with Congreve's *Love for Love*, Mrs. Bracegirdle played Angelica, which remained one of her best parts. Congreve and Rowe wrote plays for her. She also played Isabella, Portia, and Cordelia in versions of Shakespeare's plays. She left the



stage on the success of Mrs. Oldfield in 1707. She was buried in the E. cloisters of Westminster Abbey, Sept. 18, 1748.

Bracelet (Lat. *brachiale*). Band worn round the wrist. Upper Palaeolithic man wore bracelets of perforated shell and animal teeth. The oldest ornamental metal brace-

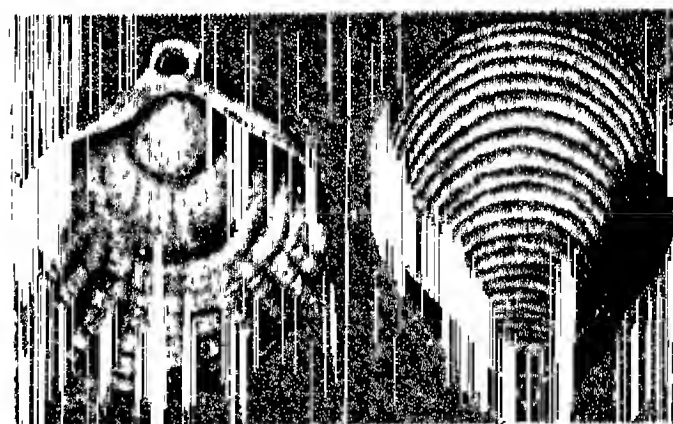
lets were uncompleted hoops made to snap round the wrist; others were of plate metal. The modern expanding bracelet is like the ancient open-work and wire-work jewelry of Assyria and the East.

Bracelet-wood (*Jacquinia armillaris*). Evergreen shrub of the family Theophrastaceae, a native of the West Indies. The fleshy fruits are bright yellow, filled with pulp, in which the shiny brown and yellow seeds are embedded. These seeds are threaded to form bracelets—hence the name.

Brachial Artery (Gr. *brachion*, arm). Main artery of the upper arm. It runs along the inner side of the arm in the earlier part of its course, gradually inclining forwards to terminate at the bend of the elbow by dividing into the radial and ulnar arteries.

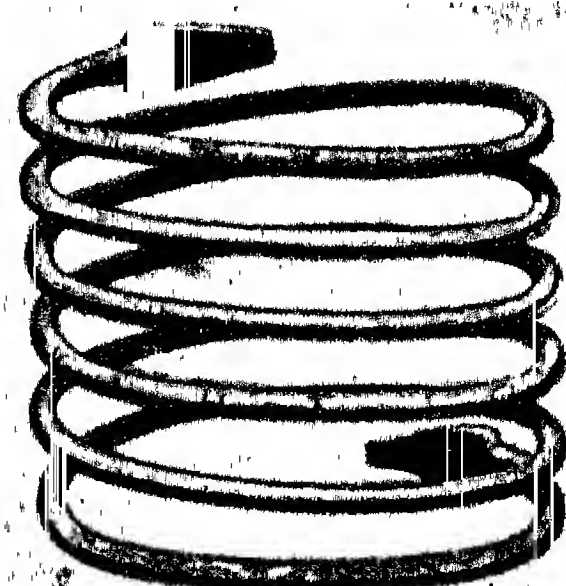
Brachial Plexus (Lat. *plectere*, to weave). Complex mass of nerves formed by the union and subsequent division of the four lower cervical nerves and part of the first dorsal nerve. From it spring the main nerves which supply the arm.

Brachiopoda (Gr. *brachion*, arm; *pous*, foot). Group of marine animals commonly called lamp-shells. Though not closely related, they bear a superficial re-



Brachiopoda. Internal view of shell of, left, *Terebratula dorsata*; right, *Terebratula globosa*

semblance to bivalve molluscs. At one time exceedingly common, they have steadily declined since the Devonian period. Some of the earliest brachiopods known were very similar to living forms. All

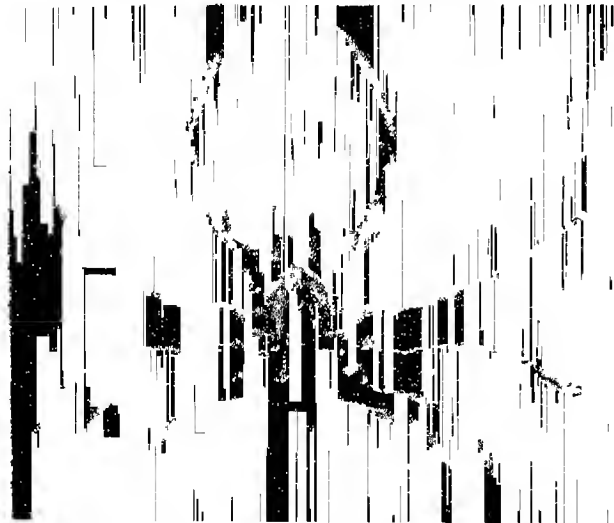


Bracelet. Left, bronze bracelet of early Iron Age found at Cowlam, Yorkshire. Above, bracelet of 4th century B.C.

brachiopods have two shells which cover the dorsal and ventral surfaces (not right and left sides as with molluscs). Those with hinged shells (Articulata) live attached to rocks, those with unhinged shells (Inarticulata) live in burrows in the sea floor. They feed on minute organisms swept into their mouths by currents of water set up by cilia on the arms of the long coiled lophophore.

Brachycephalic (Gr. *brachys*, short; *kephale*, head). Term usually denoting human heads and skulls whose breadth is at least four-fifths of their length. The round- (short-, broad-) headed form is especially frequent in the Alpine regions of S. Europe, Anatolia, and across central Asia. It is also frequent in groups living in Burma, Indo-China, parts of Indonesia, and E. Polynesia; while in America it appears in the N. Pacific region, along the central and Andean tablelands, and in Patagonia.

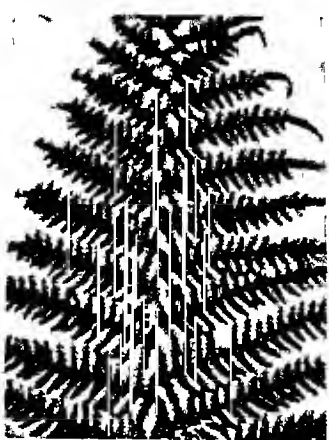
Brachyura (Gr. *brachys*, short; *oura*, tail). Sub-order of crustaceans comprising the true crabs. They have a greatly reduced



Brachyura. Underside of *Maia squinado*, showing the pleon (tail) folded under the body

abdomen which is bent forward and permanently tucked under the flattened cephalo-thorax. The eyes are stalked; the first pair of legs is usually modified to form large pincers. Members of the group differ widely in shape, colour, etc.

Bracken OR **BRAKE** (*Pteridium aquilinum*). Fern of world-wide distribution. Found in all the temperate and many tropical



Bracken. Under-surface of frond

regions, it is a social plant, growing in masses upon great stretches of heath, moorland, and forest. There is no "crown" of fronds, the stout rootstock that creeps exten-

sively underground giving off fronds singly at intervals. The fronds are triangular in outline, 2, 9, occasionally 12 ft. in height, leathery and much divided, and the spores are produced in continuous lines of sori under the turned-back margin of the frond.

Bracken, BRENDAN BRACKEN, VISCOUNT (b. 1901). British politician. Born in Scotland, educated



Viscount Bracken, British politician

at Sedburgh, he was Conservative M.P. for N. Paddington 1929-45, for Bournemouth 1945-50, for E. Bournemouth 1950-52. Having been chairman of The Financial News and editor of The Banker, he was parl. private secretary to Winston Churchill 1940-41, then minister of Information until 1945, then first lord of the Admiralty in the "caretaker" govt. of that year. Ill-health compelled him to retire from the Commons in 1952. Later that year he was made a viscount.

Brackenbury, SIR ROBERT. Constable of the Tower of London. According to More, when Richard III in 1483 imprisoned Edward V and the duke of York, Brackenbury disobeyed a warrant to put them to death; but gave the keys for one night to Sir James Tyrrell, who had the murder carried out.

Bracket (Fr. *braguette*). (1) Projecting piece of stone, wood, or metal with a horizontal supporting surface usually sprung from a vertical surface. (2) Metal pipe, usually ornamented, projecting from the wall of a room or apartment and carrying gas or electric light fittings. (3) Signs [. . . .] for enclosing words, sentences, or mathematical symbols, indicating that the enclosed matter is separated from its context. The word ultimately comes from Lat. *bracae*, breeches, referring to the bifurcation of the architectural bracket.

Bracket Fungi. Fungi of wood like, corky, or leathery consistency that stand out from tree trunks after the manner of brackets. The woody forms are well exemplified by the touchwood brackets (*fomes*), which are perennial and attain great solidity. The birch



Bracket fungi. *Polyporus giganteus*

bracket (*Polyporus betulinus*) is a representative of the corky kinds, and a familiar example of the leathery sort is *Polystictus versicolor*.

Bracklesham Beds. Middle Eocene beds of

the Hampshire basin. They are named from Bracklesham Bay, in Sussex, where they are well exposed and yield numbers of marine fossils, and are also well developed in the Isle of Wight. They consist of blue, grey, and green clays with interbedded sands.

Brackley, THOMAS EGERTON, VISCOUNT (1540-1617). English lawyer. The natural son of Sir Richard



Viscount Brackley, English lawyer

Engr. by E. Scriven

Egerton, he was born at Ridley, Cheshire, educated at Brasenose College, Oxford, and called to the bar in 1572. Solicitor-general in 1581 and attorney-general in 1592, he was knighted in 1593, and was the trusted counsellor of Elizabeth, who made him master of the rolls, 1594, and lord keeper of the great seal, 1596. Created Baron Ellesmere in 1603 and Viscount Brackley in 1616, he was lord chancellor from 1603 until a few days before his death, March 15, 1617.

Bracknell. Town of Berkshire, England, situated 32 m. W.S.W. of London, near the borders of Windsor Forest. Bracknell parish was created in 1851. In 1949 the area was scheduled for development under the New Towns Act of 1946, and by 1955, 1,160 houses, a shopping centre, schools, and factories had been built. Industries include precision engineering and the manufacture of synthetic building materials. Pop. (1951) 5,142; (est. 1955) 9,000.

Bracquemond, FÉLIX HENRI (1833-1914). French painter and engraver. Born in Paris, May 22, 1833, he was apprenticed to a firm of commercial lithographers at 15, and later became a pupil of Guichard. At the Exposition of 1900 he was awarded the grand prix for engraving. He made a fine plate of Holbein's portrait of Erasmus. He died in Paris, Oct. 29, 1914,

Bract (Lat. *bractea*, thin metal plate). Small leaf-like organ produced on the flower stalks of plants often just below the calyx, or below the point where the flower-stem branches. It is a modified leaf.



Bract of lime fruit

Bracteate. Personal ornament comprising a thin disk of gold or silver, with a design beaten out in relief. The portraits on imperial Roman coins carried by the Vistula route to Sweden, Norway, and Denmark were copied locally and afterwards superseded by man-headed animals and interlaced patterns. The largest were 5 ins. in diameter. Threaded alternately with beads, they were worn as necklets by both men and women. The term denotes also a cheap coin, stamped on one side only, produced in medieval Germany in imitation of Byzantine money about 1150.

Bracton OR **BRATTON**, **HENRY DE** (d. 1268). English judge. Born at Bratton, Devon, he became the friend of Henry III and an itinerant judge. He held various ecclesiastical appointments and was chancellor of Exeter cathedral (1264). His great work was a treatise on the laws and customs of England, "incomparably the best work produced by any English lawyer in the Middle Ages" (F. W. Maitland). It was printed first in 1569, and was edited by Sir Travers Twiss in the Rolls series, 1878-83. The development of English law was much influenced by the decisions Bracton quoted.

Bradbury, **JOHN SWANWICK BRADBURY**, 1ST BARON (1872-1950). British civil servant. Born Sept. 23, 1872, educated at Manchester grammar school and Brasenose, Oxford, in 1896 he entered the civil service by open competition and secured a post in the colonial office. Transferred to the Treasury, he rose to be a principal clerk there. In 1911 he was made a member of the national health insurance commission, and in 1913 he became joint permanent secretary to the Treasury. He was there until 1919 and his name appeared on the earliest £1 and 10s. Treasury notes. Knighted in 1913, he was chief British representative on the reparations commission, 1919-25. Created a peer, 1925, he was chairman of the national food

council, 1925-29. He was twice president of the British bankers' association. He died May 3, 1950.

Bradda Head. Headland of the Isle of Man, near the S.W. extremity, on the N. side of Port Erin. It has noted cliff scenery, caves, and lichens, and rises to 400 ft., being crowned with a tower.

Braddock. Borough of Pennsylvania, U.S.A., in Allegheny co. On the right bank of the Monongahela, 10 m. S.E. of Pittsburgh, it is served by the Pennsylvania and other rlys. It carries on brisk steel rail and rail-road car industries. Pop. (1950) 16,488. North Braddock is a separate borough, incorporated 1897. Chiefly residential, it also manufactures steel rails. Pop. (1950) 14,724.

Braddock, **EDWARD** (1695-1755). British soldier. He commanded a battalion of Coldstreamers in Holland under the prince of Orange, 1746-48, became a major-general in 1754, and was sent to America to take command against the French. He decided to invest Fort Duquesne (now Pittsburg), but being totally unused to backwoods warfare was ambushed 7 m. from his objective. He displayed great bravery, but was mortally wounded in the battle, dying July 13, 1755.

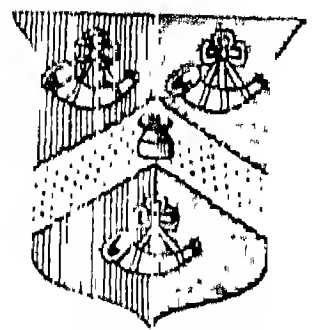
Braddon, **MARY ELIZABETH** (1837-1915). British novelist. She was born in London, the daughter of a solicitor. Her first great success was *Lady Audley's Secret*, 1862. This was followed by a long series of novels in which she showed herself an adept in handling sensational plots. Her 70 novels include *Aurora Floyd*, 1862; *The Doctor's Wife*, 1864; *The Trail of the Serpent*, 1866; *Dead Sea Fruit*, 1868; and *the Green Curtain*, 1911. Miss Braddon, who died Feb. 4, 1915, was the wife of John Maxwell, publisher, and mother of W. B. Maxwell, novelist.

Bradfield. Parish and village in the W. Riding of Yorkshire, England, 7 m. N.W. of Sheffield. There are several reservoirs, one of which, Old Dale Dyke reservoir, burst in a storm, March 11, 1864, drowning 238 people.

Bradfield College. An English public school, 8 m. W. of Reading, Berkshire. It was founded in 1850 on Church of England lines. It has about 320 boys, and scholarships both to the school and to the

universities. It is famous for its performance of Greek plays, first given in 1890 by the boys in an open-air theatre that was constructed on the Greek model; and for its annual natural history exhibition of boys' work.

Bradford. Manufacturing city in the W. Riding of Yorkshire, England. A county borough, it lies in a picturesquely hilly district on the banks of the river Aire, 9 m. W. of Leeds, and 191 m. N.N.W. of London, and is well served by main line railways.



Bradford arm

Famous for its spinning and weaving of worsted, Bradford has long been the chief centre in England of this industry. The first mill was established in 1798. Textiles are produced on a considerable scale—woollens, silks, velvets, cottons, mohair, and alpacas. In the neighbourhood iron and coal are extensively worked, and there are several large engineering works and foundries in the city.

Town planning areas have been mapped, arterial roads constructed or widened, and an ambitious improvement scheme adopted for the central area, the corporation having acquired blocks of property to facilitate the carrying out of its plans.

Foremost among public buildings is the French-Gothic town hall, erected in 1873 at a cost of £120,000, and since enlarged. Facing the town hall is the mechanics' institute. The exchange, opened 1867, contains a statue of Cobden; the Cartwright memorial hall, erected in 1904 in honour of Edmund Cartwright, inventor of the power loom, houses the art gallery and museum.

Bradford became a bishopric in 1919, the see consisting mainly of the archdeaconry of Craven and, with certain exceptions, the rural deanery of Otley. The parish church of S. Peter, which was selected as the cathedral church, is a Perpendicular building erected about 1458. Besides some thirty established churches Bradford has Roman Catholic, Wesleyan, Baptist, and other places of worship.

Among educational institutions are the grammar school, founded in the 16th century, and lodged in a new building in 1873; the technical college, opened in 1882, and acquired by the corporation seven years later; the Yorkshire independent college, founded 1888 as



Airedale College ; and the mechanics' institute, established in 1832. The city's benevolent institutions include hospitals and asylums for orphans and for the blind, deaf, and dumb. An excellent system of parks and open spaces is maintained, the most extensive being Peel Park, Manningham or Lister Park, Bowling

Park, all upwards of 50 acres in area, Horton Park, Harold Park, Bradford Moor Park, Ladyhill Park, Victoria Park (Oakenshaw), Wibsey Park, and Roberts Park (Saltaire), presented to the city by Sir James Roberts, Bt., in memory of his son. The corporation have also acquired Baildon Moor and Shipley Glen, an area of 750 acres.

The city's water supply and public markets are the property of the corporation. The hospitals include those for infectious diseases, for maternity, and for infants. The municipal authorities laid a light railway in 1907 between Pateley Bridge and Lofthouse, traversing the Nidd valley, whence the city's water supply is chiefly derived. Market days, Mon. and Thurs. Pop. (1951) 292,403.

Bradford is mentioned as early as 1066. Following the Conquest the manor was successively in the possession of the Lacys, the earls of Lancaster, and the Crown. In the Civil War it supported the parliament, and sustained sieges in 1642 and 1643. It was incorporated in 1847, became a co. bor. in 1888, and a city in 1897. It returned two M.P.s 1832-85, three to 1918, then four, becoming four bor. constituencies in the 1948 redistribution. In 1907 the chief magistrate became lord mayor.

Sir Edward Appleton, Sir Douglas Mawson, Sir William Rothenstein, Frederick Delius, and J. B.

Priestley were natives. The city figures in Priestley's *The Good Companions*, and in Howard Spring's *Fame is the Spur*.

Bradford. A city of Pennsylvania, U.S.A., in McKean co. It is an important rly. junction, 78 m. S. of Buffalo, on the Pennsylvania and other rlys. It has refineries, boiler shops, glass fac-



Bradford, Yorkshire. Market Street, showing (centre background) the campanile of the French-Gothic Town Hall. Upper picture, Cartwright Memorial Hall, in Lister Park, housing the art gallery and museum

tories, railroad machine shops, and chemical works, with manufactures of motor cycles, tanks, and extensive oil interests. Pop. 17,691.

Bradford, Sir Edward Eden (1858-1935). British sailor. Born Dec. 10, 1858, he entered the navy in 1872, and first saw active service in the Egyptian War, 1882. He became a rear-admiral in 1909, and during 1911-14 was in command of the training squadron. On the outbreak of the First Great War he was in charge of a battle squadron of the Grand Fleet, a post he retained until early in 1916. He was knighted in 1916, and retired in 1918 with the rank of admiral. He died Nov. 25, 1935.

Bradford, John (c. 1510-1555). English Protestant reformer. Born at Manchester, he served with the army in France, 1544, and in 1547 entered the Inner Temple. The following year he entered S. Catharine's Hall, Cambridge, and in 1549 was elected fellow of Pembroke



John Bradford, English Protestant reformer

Hall. Ordained in 1550, he was made prebendary of S. Paul's cathedral and chaplain to Edward VI, and became known as an earnest preacher of Protestant

doctrine. On the accession of Queen Mary he was arrested on the charge of preaching seditious sermons, and imprisoned. A year later he was examined, and, maintaining his position, denying particularly the Roman Catholic teaching concerning the Mass, was condemned to be burnt as a heretic. The sentence was carried out at Smithfield, June 30, 1555. His numerous writings were edited by Aubrey Townsend for the Parker Society, Cambridge, 1848-53.

Bradford, Sir John Rose (1863-1935). British physician. Born in London, May 7, 1863, he was educated at University College School, taking his medical degrees at University College and University College Hospital. He soon became eminent as a physician and lecturer. From 1909 to 1915 he was secretary to the Royal Society, of which he was a fellow. He was knighted in 1911. From 1926 to 1931 he was president of the Royal College of Physicians. He died April 7, 1935.

Bradford, William (1590, N.S.-1657). Pilgrim Father. He was born at Austerfield, Yorkshire, and became associated in his youth with the puritan separatists at Scrooby, Nottinghamshire. He left England and lived for some years as a silk weaver at Amsterdam. He advocated a settlement in America, and in 1620 sailed in the *Mayflower* for New England. In 1621 he was made governor of the colony of Plymouth, and except for five years he kept the position until his death, May 9, 1657. He wrote *The History of the Plymouth Plantation*, first published in 1856.

Bradford, William (1663-1752). British printer. Born in Leicestershire, England, May 20, 1663, he learnt printing in London, and in 1682 emigrated with Penn. His first publication was the *Kalendarium Pennsilvaniense* or *America's Messenger*, 1685. Arrested for supporting the Quakers, 1692, he moved on his release to New York the following year. His *New York Gazette*, established 1725, was the first paper in the colony. He died May 23, 1752. Several of his descendants became well-known newspaper proprietors.

Bradford Clay. Local division of the Great Oolite group. It is developed in the S.W. of England, especially around Bradford-on-Avon. A grey marly clay about 10 ft. thick at the base of Forest Marble, it thins rapidly northwards, like the Forest Marble, leaving the overlying Cornbrash resting on the Great Oolite.

Bradford-on-Avon. Town and urb. dist. of Wiltshire, England. It is 9 m. S.E. of Bath on both banks of the Avon. The small Saxon church of S. Lawrence is said to be the oldest unaltered church in England. Bradford also has a 14th-century tithe barn, and an old bridge with a chapel on it. Pop. (1951) 5,628.

Brading. Parish and village of Hants, England, in the Isle of Wight. It is 4 m. S. of Ryde. It retains its stocks and bull-ring, and has remains of a Roman villa with tiles, mosaics, and other survivals.

Bradlaugh, CHARLES (1833-91). British freethinker and politician. Born at Hoxton, London, Sept. 26, 1833, son of a solicitor's clerk, he served for three years in the Dragoon Guards. Subsequently he obtained work in a lawyer's office, and engaged in radical propaganda under the name of Leonoclast. He founded *The National Reformer*, and was successful in much of the



Charles Bradlaugh,
British freethinker

litigation entailed by his publications. In 1877-78, he and Annie Besant (*q.v.*), prosecuted for publishing an "obscene work" (a pamphlet advocating control of conception) and found guilty, won on appeal on the ground that the form of the original indictment was defective. In 1880 he was returned as M.P. for Northampton. When about to take his seat he asked to be allowed to affirm instead of taking the oath. Permission was refused by the chairman's casting vote of a committee appointed to consider his request. He then expressed willingness to take the oath, but was not allowed to do so, and was forcibly removed from the chamber, from which he was more than once expelled, to be re-elected by his constituents until in 1886 he took his seat, affirming without opposition, and sat for five years. The resolutions of expulsion were expunged before his death, Jan. 30, 1891.

Bradley, ANDREW CECIL (1851-1935). British scholar, noted for his brilliant criticism. Born March 26, 1851, educated at Cheltenham College and Balliol College, Oxford, he was fellow and lecturer at Balliol during 1874-81. First professor of literature and history at University College, Liverpool, 1881-89, he retired in 1890 except for his appointment as professor

of poetry at Oxford, 1901-06, and devoted himself to literary criticism, declining the first Cambridge chair in English. His *Shakespearean Tragedy*, 1904, is brilliantly perceptive and a classic of its kind. *Oxford Lectures on Poetry*, 1909, also has outstanding merit. He died Sept. 2, 1935.

Bradley, FRANCIS HERBERT (1846-1924). British philosopher. Born Jan. 30, 1846, at Glasbury, Brecknockshire, he was educated at Marlborough and University College, Oxford. In 1876 he was elected a fellow of Merton College, and spent the rest of his life in Oxford, dying Sept. 18, 1924, just after receiving the O.M. His philosophy, based on that of Aristotle and Hegel, was influenced by T. H. Green. Unlike Green, however, who believed in the personality of God, Bradley regarded the absolute as suprapersonal. He also rejected the attribution of goodness to God, and denied the view that personal immortality is an implication or postulate of the moral life. The neo-hegelian idealism of Bradley is tempered by an inherent empiricism, illustrated by his remark that "metaphysics may be the finding of bad reasons for what we believe upon instinct; but to find these reasons is no less an instinct." His chief writings include: *Ethical Studies*, 1876 (2nd ed. 1927); *The Principles of Logic*, 1883 (2nd ed., in 2 vols., 1928); *Appearance and Reality*, 1893 (2nd ed. 1897, corrected 1908); *Essays on Truth and Reality*, 1913; *Collected Essays*, 1935.

Bradley, JAMES (1693-1762). British astronomer whose chief claims to fame are his discovery of the aberration of light; an apparent annual displacement of the fixed stars produced by the fact that the orbital speed of the earth is not infinitesimally small compared with that of light; and of nutation in the astronomical sense of a nodding motion of the earth's axis in a period of 19 years. He was born in March, 1693, at Sherborne, Gloucestershire, and educated at Northleach grammar school and Balliol College, Oxford. He was ordained, but in 1721 forsook the pulpit and became Savilian professor of astronomy at Oxford. In 1742 he succeeded Halley as astronomer royal at Greenwich Observatory, where his first work was to repair the instruments. He died at Chalford, Gloucestershire, July 13, 1762. He left 15 MS. books of observations (published in 2 vols. 1798 and 1805).

Bradman, SIR DONALD GEORGE (b. 1908). Australian cricketer. Born at Cootamundra, N.S.W., Aug. 27, 1908,

he played for his state 1927-34 and subsequently for South Australia on moving to Adelaide. Representing Australia in test matches 1928-48, he first came to



Sir Donald Bradman,
Australian cricketer

England in 1930, and was captain from 1936. Bradman's records included the highest score in first-class cricket of 452 not out, against Queensland in 1930; six successive centuries, 1938-39 (equal to C. B. Fry); highest aggregate (5,028), best average (89.78), and most centuries (19) in Anglo-Australian test matches; highest aggregate in Australian first-class cricket; best score for an Australian against England (334); 1,000 in England by May 27, in 1938, in which year his average was 115.66. Joining the R.A.A.F. in 1940, he transferred to the army, but was invalided out and returned to stockbroking (and cricket). The most completely equipped batsman of his time, he was knighted 1949, in which year he retired from first-class cricket. He published *My Cricketing Life*, 1938; *Farewell to Cricket*, 1950.

Bradshaw, GEORGE (1801-53). British printer, first publisher of railway guides. Born at Salford, July 29, 1801, he served his apprenticeship as an engraver and printer, and then turned his attention to producing maps. In 1839 he issued Bradshaw's *Railway Time Table* as a small 18mo. book bound in cloth and priced at 6d. In Dec., 1841, he began publication of time-tables in the form of a monthly railway guide. He died of cholera Sept. 6, 1853, at Christiania (Oslo).

Bradshaw, HENRY (1831-86). British scholar. He was born in London, Feb. 3, 1831, and educated at Eton and King's College, Cambridge. In 1859 he was appointed to arrange the MSS. and early printed books of the Cambridge University Library, and in 1867 he was elected university librarian. Among his discoveries were: in 1857, *The Book of Deer* (published 1869); in 1862 the *Vaudois MSS.*, which showed that Vaudois Protestantism arose in the 15th century; and in 1866 two early Scottish poems, *The Legends of*

the Saints, and John Lydgate's Troy Book, which he wrongly attributed to Barbour. He died at Cambridge, Feb. 10, 1886. *Consult* Memoir, G. W. Prothero, 1888; Collected Papers, 1889.

Bradshaw, JOHN (1602-59). An English judge and regicide. The son of a country gentleman of Cheshire, he



Jo. Bradshawe

was called to the bar at Gray's Inn in 1627, and was appointed chief justice of Chester in 1647. In 1649 he was chosen president of the commission set up by the Commons for the trial of Charles I, upon whom he pronounced sentence. President of the council of state 1649-52, he became an opponent of Cromwell, and remained a republican until his death, Oct. 31, 1659. He was buried in Westminster Abbey. At the Restoration Bradshaw, who had been excluded from pardon in the proclamation of Charles II, and after the Restoration his body was dug up and hanged at Tyburn and there buried. Jan. 30, 1661.

Bradstreet, JOHN (1711-74). British soldier. He served with the British forces in America in 1745, and the following year was made lieutenant-governor of St. John's. In 1756, while in command of a convoy from Albany to Oswego, he defeated an attack by the French and Indians near the present city of Fulton, and in 1758 took part in the attack on Ticonderoga, and captured Fort Frontenac. He made a treaty with the Indians at Detroit in 1764, and was made a major-general in 1772.

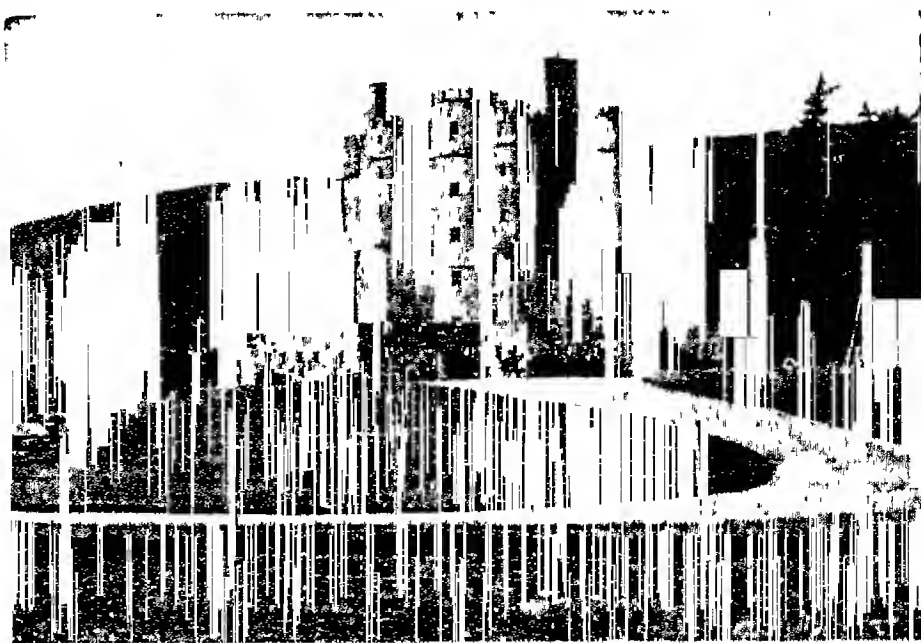
Bradwardine, ROSE. One of the heroines of Scott's novel, Waverley. Only and beloved child of the old Scottish cavalier, Baron Bradwardine of Tully-Veolan, she embodies the domestic virtues as contrasted with the adventurous spirit of Flora MacIvor (*q.v.*).

Bradwardine, THOMAS (c.1290-1349). English prelate and scholar. Educated at Merton College, Oxford, as proctor he successfully resisted the claims of the archdeacon of Oxford to the spiritual jurisdiction of the university. This made the university totally exempt from all episcopal jurisdiction. Ten years later Richard de Bury made Bradwardine prebendary and archdeacon of Lincoln, and in 1338 he was chancellor of S. Paul's and the confessor of Edward III. On the truce with France and Scotland in

1346, Bradwardine was one of the peace commissioners, and in 1349 he was consecrated archbishop of Canterbury. He died of the plague in London on Aug. 26, 1349. His theological writings were chiefly directed against Pelagianism, and on account of his mathematical treatises he gained the name of the Profound Doctor.

Brady, NICHOLAS (1659-1726). Anglo-Irish poet and divine. Born at Bandon, co. Cork, Oct. 28, 1659, and educated at Westminster and Christ Church, Oxford, he was ordained, and held several livings in Ireland. He supported William of Orange, but saved his native town from being burnt by the army of James II. From 1696 he was rector of Richmond, Surrey. He wrote a tragedy called *The Rape*, 1692, an Ode for S. Cecilia's Day, and collaborated with Nahum Tate (*q.v.*) in a metrical version of the Psalms used in the Church of England for more than 100 years. Brady died May 20, 1726.

Braemar. District and village of S.W. Aberdeenshire, Scotland. Surrounded by the Cairngorm Mts., and watered by the Dee, it has



Braemar Castle, situated amidst some of the finest scenery of the Scottish Highlands

Valentine

typical Highland scenery and deer-forests, and is a great tourist resort. There are many castles, hunting-lodges, and mansions, including Balmoral, Abergeldie, and Braemar castles, and Mar Lodge. Castleton of Braemar, the village, 17 m. W.S.W. of Ballater, has a meteorological station. A Highland gathering is held annually.

Braeriach. Peak of the Cairngorm Mts., Scotland, on the borders of Aberdeenshire and Inverness-shire. Its alt. is 4,248 ft.

Brag. Card game for several persons, from which poker is derived. It is played with a full pack, and the cards rank as in whist with certain exceptions. Three cards are dealt to each player, one at a time, the last round being given face upwards. There are no trumps.

The three distinct stakes played

for are: (1) Holding the highest card; in the case of two players holding cards of equal value, the first player of the card wins. (2) This is decided by the players betting or "bragging" against each other, should either hold a pair or a pair-royal. A pair or pair-royal takes precedence according to the value of the cards composing it. A pair-royal (three of a kind) always beats a pair of any denomination. The knave of clubs is used in much the same way as the joker in poker and can represent any card required to make a pair or pair-royal. (3) This stake falls to the player whose cards contain pips which total 31 or come nearest to that number. Aces may count for 1 or 11 according to arrangement. For the last named stake players may draw from stock, but will lose by overdrawing.

In the commonest form of brag three cards are dealt face downwards and the respective values of the hands rank: pair royal; running flush, *i.e.* a sequence of one suit; an ordinary run or sequence of mixed suits; a pair. Failing a pair, a hand containing an ace beats one in which the highest card is a king.

Braga. Administrative district of N.W. Portugal. It lies within the province of Minho and has an area of 1,050 sq. m. Mountainous in the N.E., it is level in the coast districts. Cattle rearing, dairy farming, and leather and hardware making are the main industries. Pop. (1950) 541,377.

Braga. City of Portugal, capital of a district of the same name. It is 30 m. N.N.E. of Oporto. The seat of the primate of Portugal, it is an agricultural centre, with some light industry. On the site of the Roman Bracara Augusta, it is a walled town with a citadel, a 12th-century cathedral, an archiepiscopal palace, and library, remains of a Roman theatre, aqueduct, and temple, and other antiquities. Near the town, on a lofty eminence reached by funicular railway, stands the sanctuary of Bom Jesus, visited annually by many pilgrims. Pop. (1950) 32,624.

Braga, TEOPHILO (1843-1924). Portuguese man of letters and statesman. Born in the Azores, he studied law at Coimbra, and in 1872 became professor of modern

languages at Lisbon. A republican and positivist, on the fall of the monarchy he became provisional president of the republic, Oct., 1910-Aug., 1911, and president May 29-Oct. 6, 1915. A poet of distinction, he wrote also on history, philology, and literature. He died Jan. 28, 1924.

Bragança. Administrative district of Portugal. It is within Trás-os-Montes e Alto Douro prov., and has an area of 2,527 sq. m. Bounded S. and S.E. by the Douro, and N.E. and N. by Spain, it is mountainous. It produces chestnuts, marble, iron ore, and coal, and raises sheep and silkworms. Pop. (1950) 227,125.

Bragança. City of Portugal, the capital of Bragança dist. It is picturesquely situated on the river Ferrença, 110 m. E.N.E. of Oporto, and 8 m. from the Spanish border. It is the seat of a bishopric, and consists of an old walled upper town, containing the cathedral, and a modern lower town. Its citadel was the cradle of the dynasty of Bragança. It makes textiles, hats, and chocolate, and has an airfield. Pop. (1950) 8,250.

Bragança. Seaport of Brazil, in the state of Pará. It is on the navigable Caité, near the coast, 145 m. by rly. N.E. of Belém. An agricultural town, it trades in sugar, cotton, rice, mandioca, cattle, and pigs. Pop. (est.) 12,000.

Braganza OR BRAGANÇA. Name of the ruling family of Portugal 1640-1853 and of Brazil 1822-89. The house is descended from Alphonso, a natural son of King John I. He was made duke of Braganza in 1442, and in 1580, when King Henry died without direct heirs, one of his descendants claimed the throne. Philip II of Spain secured it but in 1640, when the Portuguese expelled the Spaniards, a duke of Braganza became king as John IV. Members of the family remained on the throne, except when Napoleon controlled the country, until Maria II died, 1853, when the throne passed to her children by Ferdinand of Saxe-Coburg. Catherine (1638-1705), wife of Charles II of England, was of this family. In Brazil there were two Braganza emperors, Pedro I (father of Maria II) and Pedro II, who was expelled in 1889.

Bragg, Sir William (Henry) (1862-1942). British physicist who, with his son, did notable work on crystal structure. Born July 2, 1862, he was educated at King William's College, I.O.M., and at Trinity College, Cambridge. While professor of mathematics

and physics at the University of Adelaide, South Australia, 1886-1908, he conducted his earlier researches into radio-activity. He became

Cavendish professor at Leeds in 1909, and was Quain professor of physics at London 1915-23. Elected F.R.S. 1906, he was knighted 1920, and in 1931 was awarded the O.M. In 1915 he shared with his son the Nobel prize for physics and Columbia University's Barnard medal for their work on X-rays and crystals. By developing the X-ray spectrometer, father and son did much to elucidate the arrangements of atoms and crystals.

Sir William Bragg was appointed Fullerian professor of chemistry at the Royal Institution and director of the Davy-Paraday research laboratory in 1923, and was president of the Royal Society 1935-40. During the First Great War he was adviser to the Admiralty on submarine detection; and in the Second Great War was chairman of a scientific committee on food production. In addition to his outstanding work in crystalline analysis and X-ray spectroscopy, he was an advocate and exponent of scientific research in industry, and in his Christmas lectures to children at the Royal Society was a notable populariser of scientific principles. His publications included X-rays and Crystal Structure (with his son), 1915; The World of Sound, 1920; Concerning the Nature of Things, 1925; The Universe of Light, 1933. He died March 12, 1942.

Sir William Bragg's son, Sir (William) Lawrence Bragg, was born March 31, 1890, at Adelaide, South Australia, and educated at St. Peter's College there, Adelaide University, and at Trinity College, Cambridge. During the First Great War he was



Sir Lawrence Bragg.
British physicist

technical adviser on sound-ranging in France, and in 1919 became professor of physics at Victoria University, Manchester. Elected F.R.S. 1921, he was director of the National



Sir William Bragg.
British physicist

Physical Laboratory 1937-38, and Cavendish professor of experimental physics, Cambridge, 1938-53. Appointed Fullerian professor of chemistry, Royal Institution, 1953, he became professor and director of the laboratories of the Royal Institution in 1954. He was knighted in 1941. Amongst his published works are The Crystalline State, 1934; Electricity, 1936; Atomic Structure of Minerals, 1937; Science and Faith, 1941; Science Lifts the Veil, 1943.

Bragi. In Norse mythology, one of the principal Aesir. He was the god of poetry and the husband of Idun. When Aegir visited the hall of Odin he sat next to Bragi, who answered all his questions with stories of the gods and the sources of wisdom and poetry.

Brahe, Count Per (1602-80). Swedish administrator. Born near Stockholm, Feb. 18, 1602, he was appointed chamberlain to Gustavus Adolphus in 1626. He served in the Polish war of 1626-29 and in Germany in 1630. He was twice governor-general in Finland, 1637-40 and 1648-54, his administration being marked by the construction of new towns, the organization of a postal system, and the founding of the University of Åbo (Turku). He died Sept. 2, 1680.

Brahe, Tycho or Tyche (1546-1601). Danish astronomer. Born Dec. 14, 1546, at Knudstrup, in Sweden, of noble family, he was entered at Copenhagen University. He studied rhetoric and philosophy; but an eclipse of the sun in 1560 directed his attention to the study of Ptolemy's works. Three years later, when he was at Leipzig ostensibly studying law, Brahe discovered that the positions of the planets did not coincide with those assigned them by accepted astronomical calculations, and he planned to carry out a series of measurements of their positions with such primitive instruments as he could command. In 1572 he discovered a new star in Cassiopeia, thus refuting the Aristotelian doctrine that everything beyond the moon was fixed and changeless. He published the first of his astronomical works, De Nova Stella, in 1573.

In 1576 Frederick II of Denmark conferred on him Hven Island near Elsinore and financed the building of Uraniborg (castle of the heavens) which on its completion in 1580 became a nursery of astronomy for the whole of Europe. Here Tycho worked for 20 years, principally at the determination of the places of the moon, planets, and stars. With improved instru-

ments of his own invention, he made a large number of precise observations of the planetary positions, which afforded Kepler the material from which he deduced his famous three laws. After the death of Frederick II Tycho left Denmark, and died at Prague, Oct. 24, 1601. *Consult* Tycho Brahe: Scientific Life in the 16th century, J. L. E. Dreyer, 1890.

Brahma (shortened form of Brahmaputra). Breed of domestic fowl. Said to be descended from two Asiatic strains originally crossed in the U.S.A., it enjoyed a great vogue in the United Kingdom in mid-19th cent., being regarded as a good all-round fowl, passable as a layer, and more than passable as a table bird. But owing to a craze on the part of fanciers for "markings" and "feathers," the



Brahma fowl. A dark Brahma cock, bronze body and cream-coloured neck

utilitarian qualities of the breed were gradually "bred out," and it degenerated into a mere prodigy of feathers and fluff.

Brahma. Term variously used in Hindu religion. It denoted, *e.g.*, worship; prayer, the act of wor-



Brahma Figure of the four-headed god and his consort Saraswati, goddess of wisdom

ship; the power of prayer; the sacred writings; a priest, especially one who supervised the sacrifices; sacerdotalism; the divine essence; the creator of the universe. As a deity Brahma is regarded as having been born from a golden egg or a lotus. In art he is usually repre-

sented with four heads and four hands, riding on a swan or goose.

Brahman OR **BRAHMIN.** Indian priestly caste. Attached as bards or household ministers to the Vedic monarchs, they came to monopolise the study and exposition of the sacred books, attaining a social supremacy which they still claim. Numbering some 17 millions, they are divided into sub-castes forming ten territorial divisions, bisected by the Narbada river into N. and S. groups. In Uttar Union, which contain one-third of the whole, only 13 p.c. follow occupations connected with religion. Most of the others are supported by agricultural work, the remainder being lawyers, doctors, government officials, clerks, policemen, artisans, cooks, and servants. They bow their heads in salutation to Brahmans alone; other castes bow to them, receiving in acknowledgement a benediction. The old food-taboos and other caste-rules, such as those prescribing an immediate change of loin-cloth or sacred thread after touching a man of impure caste, are increasingly neglected.

BRAHMANISM: AN EASTERN RELIGION

Rev. T. Witton Davies, Prof. of Semitic Languages

This article belongs to a group which deals with the great religions of the world; for instance Buddhism, Confucianism, Mahomedanism. Christianity and Religion may also be consulted

The word Brahmanism, which is derived from brahman, priest, or perhaps from brahmana, a liturgical manual, is used to denote the modified form of Vedism which took the place of the older religion soon after 1000 B.C. Its introduction was due to the increasing number and the growing influence of the Brahmans. It is less ethical but more ceremonial than Vedism (*q.v.*).

The literature of Brahmanism belongs to two classes, the inspired and the uninspired. The inspired embraces the Mantras or Vedic hymns, especially those of the Rig-Veda and the Atharvan-Veda, and the Brahmanas. These latter are prose or liturgical treatises intended primarily as manuals for the Brahmans; they furnish detailed instructions as to sacrifice and other priestly functions. They are appended to the several Samhitas, or collections of hymns in the Vedas, and are believed to explain them. They are, however, later than the Vedas, and lay principal stress on the ritual, and not, as the Vedas, on theology and ethics.

Attached to the Brahmanas, and united so closely as to seem to



Brahmanism. Kurram Dos, a Hindu Yogi or mendicant from the city of Saharumpoor, posing in the attitude of one of the gods

Brahmanas. Sacred books of Brahmanism dealing with prayer, ritual, and sacrifice regarded as inspired. See Brahmanism.

Brahmanbaria. Town of E. Bengal, Pakistan. On the Titas r., 50 m. N.E. of Dacca, it trades in rice and jute, and makes bricks and fertilisers. Pop. (1951) 38,042.

belong to them, are theosophic discourses called Aranyakas (forest or hermit discourses) and also Upanishads, or sessions, because addressed to pupils sitting. These latter are collections of philosophical *obiter dicta* uttered by many men living at different times and containing doctrines inconsistent and even contradictory. Thus in these Upanishads, the principal authority in philosophical matters to Brahmanists and also to modern Hindus, Brahma the supreme entity is conceived: (1) ontologically, as absolute impersonal being; (2) pantheistically, as the ground of being; and (3) theistically, as the personal God, the one creator and ruler. But, on the whole, it is the first conception that predominates, the second following it at no great distance.

The uninspired writings include the code of Manu, which, though parts are older, is in its existing form a product of the Brahmanic age and teaches Brahmanic doctrine. Besides containing a system of theology and philosophy, this code gives minute directions for the regulation of the individual life from the cradle to the grave.

Others are the two great epics, the Mahabharata, the great Bharata, a well-known Indian tribe, and the Ramayana. These are really mythological, poetical romances in which Krishna and Rama figure prominently. In these epics the outstanding doctrines of Brahmanism are taught, and much also which belongs to Hinduism, for like most Hindu sacred writings these have been enlarged and edited in later times. Embedded in the Mahabharata, the Iliad of India as it has been called, and independent of it, is a poem in praise of Krishna, called the Bhagavit-Gita (Holy Song), one of the most exquisite specimens of religious poetry.

Scriptures not Historical

There is a significant absence from the Indian Scriptures, Vedic, Brahmanic, and Hindu, of historical writings. The scriptures of the Old and New Testament offer a great contrast in this respect. Moreover the Indian mind seems at all times to have lacked the historical sense; we are indebted for what we know of Indian history, its dates, etc., to classical, British, and other historians. Hence the literature of the great Indian religions shows no clean-cut chronological divisions, the oldest being tacked on to the newest and *vice versa*. For this reason it is impossible to mark off confidently writings which belong to the Brahmanic or any other one period.

As regards the beliefs and practices of Brahmanism, the gods of the Brahmanas are identical for the most part with those of the early Vedas, but many others have been added. The gods of the Vedas are chiefly personifications of natural objects and forces. But while in the Vedas the deities are worshipped, feared, and conciliated by prayers and sacrifices, in Brahmanism they are regarded as controlled by the sacrifices offered or by the hymns chanted by the Brahmins. A system of magic has taken the place of theology proper. The true gods now, those who wield supreme power, are the Brahmins, on whose proper functioning as priests everything depends, even the acts of the gods themselves.

Doctrine of the Vedas

In the early Vedas natural realism or dualism is the prevailing teaching, but in the Upanishads a kind of Spinozan or Hegelian impersonal pantheism stands out most prominently. The many gods worshipped are viewed as but forms of the One All Brahma. In the Vedas the good man is the virtuous man—one who is upright and honest; but in the Brahmanas the quality which is most com-

mended is the punctilious observance of religious rites and ceremonies. Strictly speaking, everything connected with the life of the Indians, ancient and modern, has a religious aspect. Each act of a man's life—for the woman hardly counts, not even as much as in Judaism—is supposed to be religious and is accompanied by some prayer or religious rite.

Brahmanism in general is far more external, ceremonial, and even magical than Vedism. For the first time in the history of Indian religion, say from 500 B.C., the gods begin to be represented by images. The priestly class becomes a powerful closed guild. No sacrifice can be offered except by them. Moreover, since sacrifices offered according to strict regulations, accompanied by hymns faultlessly chanted, were regarded as the ultimate deciding force in bringing about all desired results (for the gods even were mastered by these), the Brahmins became virtually gods, and were more highly esteemed than the deities who were subject to their power. The materials they used for sacrifices included animals, cattle, sheep, and especially goats, and also milk, butter, meal, and various kinds of cakes. But the principal sacrifice was the soma, i.e. the juice of the soma plant, and in later times the Indians worshipped a god called Soma. One may compare these sacrifices with those of the Hebrews (animal, cereal, or vegetable, and libations) and of the Greeks and Romans.

Origin of Caste

Temples for the gods, not for worshippers, were now built. In Vedic times, as in early stages of Hebrew religion, any spot was made sacred by the act of sacrificial worship. It is in this middle age of Indian religions that the institution of caste arose, no doubt through the greatly increased power and prestige of the Brahmins. It is first mentioned in the code of Manu, but as described in that code it existed in an elementary form only, for intermarriage between castes is permitted, and the only castes recognized are those of the Brahmins and warriors, nothing being said of the Sudras, the farmers, artisans, and servants. Among the Indians caste had, no doubt, first of all a racial, and secondly a religious, origin. The fair-coloured Aryans who invaded India regarded themselves as superior to the aborigines whom they conquered, the latter being treated as pariahs or outcasts, though some of them have no doubt been incorporated into

the lowest caste or the Sudras. Among the Aryan Hindus themselves the Brahmins became naturally the highest caste, as having greatest power over gods and men, and because they were most learned.

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Brahman Ox (*Bos indicus*). Name commonly given to the zebu or Indian ox, held as sacred by the



Brahman ox, of Gwalior, India.
A sacred beast of the Hindus

Hindus. It is distinguished by the great hump of fat on the shoulders.

Brahmaputra (son of Brahma). River of Tibet, India, and Pakistan. Its length is about 1,800 m., and its drainage area about 361,200 sq. m. Rising at an alt. of 16,000 ft. on the Tibetan tableland, it flows E. as the Tsangpo for nearly 1,000 m., then, as the Dihong, passes S. in a gorge 8,000 ft. deep through the Himalayas for 200 m. into Assam, where it turns W.S.W. Near Sadiya it is joined by the Dibang and the Lohit and becomes the Brahmaputra. It traverses the Assam valley, 450 m., and then enters E. Bengal, dividing into the Jamuna (the main course), which flows S. for c. 150 m. to join the main stream of the Ganges at Goalanda; and the Brahmaputra proper (carrying little water), which reaches the sea by the broad Meghna estuary. Steamship communication is maintained between Calcutta and Dibrugarh.

Brahma Samaj (church of the one God). Title given to a theistic society in India. It was started in 1830 in Calcutta by the Rajah Ram Mohan Roy (1774-1835) to purify Hinduism and establish monotheism. Its founder, a student of philosophy and a Brahman, urged that the true Brahma faith was to be found in the Vedas, and consisted in the worship of a supreme being.

Ram Mohan left India soon after starting the society and died in England. In 1841 Debendra Nath Tagore, also a Brahman, became the leader of the movement, and he was succeeded in 1858 by Keshub Chunder Sen (1838-84). It was under Sen that the Brahma Samaj developed its creed and its activities, offering in a purified Brahmanism an alternative to Christianity. Its basis of belief was monotheistic. It declared against caste and for the universal brotherhood of man, denied the doctrine of incarnations of the divinity, and affirmed the immortality of the soul.

The more conservative members maintained that the Vedas sanc-

tioned polytheism and that caste was inviolable. A serious schism took place in 1865, when the old school, clinging to Hinduism, took the name of Adi (or original) Samaj. In 1878 the bulk of Sen's followers formed the Sadharana (or universal) Brahma Samaj, which rapidly became the largest society. The cause of the 1878 schism was Sen's betrothal of his daughter at the age of 14 after the Brahma Samaj under his rule had pronounced against child marriages. The Brahma Samaj has its headquarters in Calcutta. Its members are responsible for a considerable amount of educational and philanthropic work. See Arya Samaj.

concert tours and holidays carried him to Switzerland, Italy, Germany, and Austria, but France he never visited, nor England. In 1877 Brahms refused the offer of an honorary doctor's degree from Cambridge university, not wishing to travel to England to receive it.

In May, 1896, Clara Schumann died, and Brahms hastened to Frankfurt to attend the funeral. In his agitation he took the wrong train and arrived late. What with this mishap and the loss of his great friend, the shock seems to have brought on his own fatal illness. First it was jaundice, but within a few months his condition worsened and his liver was found to be diseased. On April 3, 1897, Brahms died of cancer.

As a man Brahms was either worshipped by his friends or detested by his enemies. There seem to have been no half-measures about his human relationships: rarely, if ever, was he treated with indifference. He was noted for caustic wit and boorish manners; also for warm-heartedness and honesty. In fact his character was a bundle of extremes—he was in turn sentimental and cold, rough and tender, playful and serious, courteous and churlish, kind and cruel. Unlike his contemporary Liszt he cared nothing for dress or the elegancies of social intercourse.

In Schumann's famous article he suggested that Brahms did not gradually show the development of his genius but, like Minerva, sprang fully armed from the head of Jove. Indeed, those early manuscripts that he showed Schumann—a group of songs and two sonatas and a scherzo for piano—are the work of an extraordinarily mature mind. Nevertheless, in his later piano compositions, which are chiefly in the form of intermezzi, capriccios, rhapsodies, and variations, Brahms's style becomes more concise, deeper in expression, and more amenable to the sonorities of keyboard writing.

Essentially a lyrical composer, he naturally excels as a songwriter. He wrote songs throughout his life, beginning with the youthful *Liebestreu* and ending—a year before his death—with the *Four Serious Songs*, which are among the greatest songs of all time. Vocal music strongly attracted Brahms, for he also wrote numerous duets, quartets, part-songs, unaccompanied and accompanied choral music, and ar-

BRAHMS: HIS LIFE AND HIS MUSIC

Ralph Hill, Author of *Brahms, A Study in Musical Biography*

This article traces the career of an outstanding figure in the history of the world's music, and includes an estimate of his achievement as a composer. See also Music; Symphony, etc.

Johannes Brahms (1833-97), the greatest symphonist of the nineteenth century after Beethoven, was born at Hamburg, May 7, 1833, and was brought up amid the squalid surroundings of a tenement building. His father, from whom he received his first music lessons, was a double-bass player who earned a living by playing in local cafés and theatres. Brahms himself in his early teens was obliged to play the piano in such places. Fortunately his outstanding gifts were recognized by Edward Marxsen, one of the foremost teachers in Hamburg, who gave him a thorough training in composition and piano technique.

In 1853 Brahms became friendly with a young Hungarian violinist named Remenyi, and the two young artists toured the neighbouring towns giving concerts. It was from Remenyi that Brahms learned a great deal about Hungarian gipsy music, the influence of which can be traced throughout his career as a composer. Remenyi also introduced him to the famous Hungarian violinist Joachim, which resulted in a life-long friendship

between the two. Brahms then met Joachim's friends Robert and Clara Schumann. On the evidence of a handful of manuscripts, Schumann proclaimed Brahms in an article in the musical press the great master of the future.

During the early years of his career Brahms led a hard and industrious life studying, writing, teaching, and conducting. Among his official appointments were those of musical director to the prince of Lippe-Detmold, conductor of the Singakademie in Vienna, and conductor of the Gesellschaft der Musikfreunde. From 1864 Brahms lived for the greater part of his life in Vienna. He eventually gave up official duties and devoted himself entirely to composing, conducting, and playing his own compositions. He never married. The story of his life is little more than the record of one composition after another being written and performed. Brahms made money and lived comfortably, but simply. He worked regularly and intensely, permitting himself a minimum of leisure, which he devoted largely to reading and conversing with his friends over dinner at the Red Hedgehog in Vienna. His



rangements of German folk-songs. Apart from the last mentioned his songs number close upon 200. German folk-song and Hungarian gipsy music played an important part in the moulding of Brahms's style. So did the works of Bach and Handel on the one hand and of Beethoven and Mendelssohn on the other.

Brahms sums up the two great schools of the classical tradition—the contrapuntal and the harmonic. In fact in his austerity of outlook and anxiety to attain perfection of form within classical limits he was the last of the great classical composers. This is shown in his love for the purest of all musical styles—chamber music. Chamber music is concerned entirely with essentials, and only a composer's best and most genuine musical ideas are good enough. A great deal of Brahms's finest music is among his chamber works: the string quartet in C minor, the piano trios in C major and C minor, the piano quartets in G minor and C minor, the clarinet quintet, the string quintet in G, and the three violin sonatas; in all of which he shows his great stature as a craftsman and expressive powers as a musical poet.

Orchestral Works

Considering the enormous extent of his output, Brahms wrote comparatively little for the orchestra. His approach to the orchestra was, again, classical in conception. He did not exploit colour for its own sake, as did the romantic composers like Berlioz and Wagner. He was concerned simply with the quality of the musical content and with the construction of fine musical architecture. Variations on a Theme of Haydn, the Tragic and Academic Festival overtures, four concertos, and four symphonies are his chief contributions. But all are masterpieces of their kind. The four symphonies show his imagination and invention at work on a large canvas with the success that only Beethoven could equal, or perhaps surpass. And upon Brahms's shoulders the mantle of Beethoven was allowed to fall.

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Brahui. Aggregation of tribes forming one-fifth of the population of Baluchistan. They speak Brahui, a Dravidian dialect. Squat, flat-featured, and heavily built, they are akin to the Veddoïd peoples of South India, Ceylon, and southern Arabia. They are the ruling folk of the Baluchistan area of Pakistan.

Braid (A.S. *bredan*, to weave). Flat woven trimming or binding. The word formerly signified deceit. The clown in The Winter's Tale asks the pedlar if he has any "unbraided" wares. To upbraid is to weave a reproach.

Braid, JAMES (1870-1950). Scottish professional golfer. Born at Earlsferry, Fife, Feb. 6, 1870, he won the open championship in 1901, 1905, 1906, 1908, and 1910; played for Scotland v. England in 1903-07, 1909, 1910, and 1912; and won the French championship in 1910. In 1921 he played for Great Britain against the U.S.A. Winner of many tournaments and holding the record over many links, he was attached to Walton Heath golf club, near Epsom. Author of several books on golf, he died Nov. 27, 1950.

Brail. Rope used to furl up sails close to the mast or yard. "Brailed up" is a phrase meaning that sails have been folded close to the spars in this manner.

Braila. Town of Rumania. On the Danube, 142 m. N.E. of Bukarest, it is connected by a branch line with the main rly. systems. An important commercial town, it has an extensive trade chiefly in grain, coal, and petroleum, and manufactures candles, soap, and rope. The principal building is the cathedral of S. Michael. Braila belonged to Turkey from the 16th century until 1828, when it passed to Rumania after its strong forts had been dismantled by the Russians. During the First Great War the Rumanians, after destroying the granaries, evacuated it Jan. 4-5, 1917, the Bulgarians and Germans occupying it. Pop. (1948) 95,514.

Braille. Form of writing and printing invented by Louis Braille (1809-52) for the use of the blind.

The first school for the blind in the world was founded in Paris by Valentin Haüy in 1783. At this school, L'Institution Nationale des Jeunes Aveugles, an embossed italic type was devised by Haüy for the use of his pupils; this type and modifications of it based upon the Roman letter were used for many years, first in France and later in

Great Britain. In 1819, Louis Braille, blind ten-year-old son of a village saddler, was admitted to the Paris blind school and taught

A	B	C	D	E	F	G	H	I	J
K	L	M	N	O	P	Q	R	S	T
U	V	W	X	Y	Z				

Braille alphabet, showing embossed system for reading and writing

to read by means of Haüy's italic type. While still a schoolboy he became aware of an embossed dot system, the invention of a French artillery officer for use during military operations in darkness. From it he eventually devised the six-dot system (see illustration) which bears his name, first intending it for the use of blind musicians, but later realizing its potentialities for the blind person wishing to read and write. The Braille system was first officially published by the Institution Nationale des Jeunes Aveugles in 1829, but did not come into general use there until considerably later.

In 1868, Thomas Armitage, a London physician obliged to give up the practice of medicine owing to failing sight, set up a small committee of blind men to examine the considerable number of embossed types then in use in English institutions for the blind. After some months of research they recommended unanimously in favour of braille for use in education, though they considered Moon type (based on the Roman letter with simplified outline) should be retained for the less literate. Armitage founded the British and Foreign Blind Association (later the Royal National Institute for the Blind) primarily to further the production of braille and to popularise its use, and some years before his death, in 1890, braille was universally adopted in the U.K. as the medium of education for the blind. The institute and the Scottish Braille press publish periodicals and books in braille, and many thousands of books are available on loan from the national library for the blind.

Braille is used for reading and writing, for the printing of literature in a wide range of languages (it can be adapted for any written language), for music, and for mathematical and scientific notation. U.N.E.S.C.O. in 1949 undertook world unification of braille notation.

Brain. An important part of the nervous system of most animals. The nervous system is divided into a central and a peripheral part. The peripheral nervous system is made up of all the nerves which extend from the central nervous system to the skin, muscles, organs, and blood vessels of the body. Normally the peripheral nerves are concerned with conduction only, while the central nervous system is responsible for the initiation and coordination of nervous activity. In vertebrates, the central part of the nervous system consists of the spinal cord and the brain, the brain being the highly-developed upper part continuous with the cord. In invertebrates the central nervous system consists of a nerve cord, or cords, linking various aggregations of nerve cells, the ganglia (in the earthworm there is one ganglion in each segment behind the mouth), and joined to a cerebral ganglion or brain in the head whose size, relative to the whole animal, depends on the state of development of sense organs in this region. It is small in the earthworm, quite large in insects, very large in cephalopod molluscs, e.g. squid and octopus.

In Vertebrates

The brain in vertebrates is contained in the cranial cavity of the skull, which, being bony, strong, and resilient, gives it great protection. There are holes in the bony cranium through which nerves pass to other parts of the body. One large hole, the foramen magnum, at the base of the skull, is the aperture through which the posterior end of the brain passes to join the spinal cord.

Inside the cranial cavity three membranes envelop the brain. The first of these, called the dura mater, is thick and strong, adherent to the inner surface of the skull bones, and forms sheaths for the nerves which enter and leave the brain. Beneath the dura mater is a very thin and delicate membrane, the arachnoid, and beneath this again the third membrane, the pia mater, lying next to the brain surface. It is separated from the arachnoid membrane by a protective fluid secretion, the cerebro-spinal fluid.

The average weight of the brain of a man is just under 50 oz., of a woman 44 oz., but there are considerable variations. Within certain limits intellectual capacity is dependent upon structure rather than weight of the brain.

The vertebrate brain and spinal cord, unlike the brains and nerve cords of invertebrates, are hollow structures. In the cord the central canal is tiny but in some parts of the brain quite spacious cavities, the ventricles, occur. Early in embryonic development the brain becomes enlarged and marked off from the rest of the neural tube by three bulges which become the forebrain, the midbrain, and the hindbrain. The forebrain soon gives rise to two large lateral outgrowths, in which the structures called the cerebral hemispheres will eventually develop. These outgrowths come to overlie the central part of the forebrain, and in man develop into the massive cerebrum covering the midbrain as well. The hindbrain gives rise to an upward

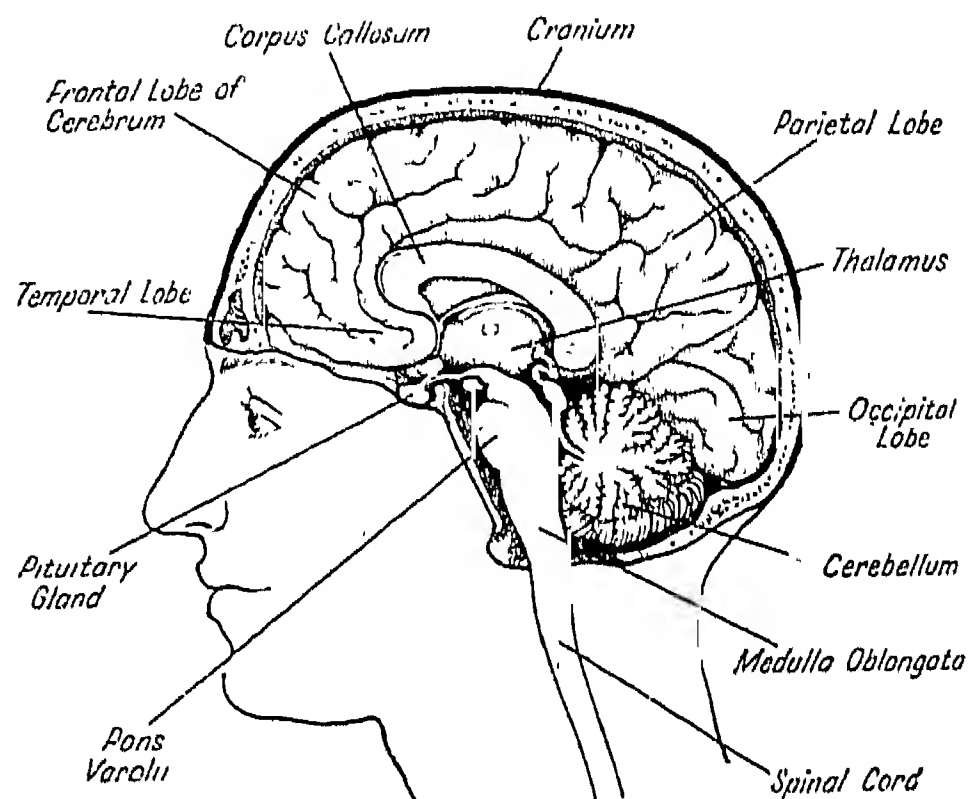
outgrowth, the cerebellum, which is also very large in man and covers most of the rest of the hindbrain.

Anatomists divide the adult human brain into three main portions: the cerebrum, the cerebellum, and the brain stem. Both the cerebrum and the cerebellum are made up of two symmetrical lobes or hemispheres which are joined to each other and to the brain stem by bundles of nerve fibres. The brain stem consists in the main of the midbrain and the non-cerebellar part of the hindbrain. In this part of the hindbrain two distinct regions are recognized: in front and below, a stout bundle of fibres called the pons varolii forms a transverse band crossing the floor of the brain; behind and merging into the spinal cord is a thin-roofed region called the medulla oblongata.

The brain stem contains two kinds of nervous tissue: (a) masses of nerve cells, called nuclei, which are responsible for maintaining most of the involuntary activities of the body; (b) masses of nerve fibres, called tracts, which connect these nuclei and the nerve cells of the brain with the peripheral nerves. The medulla oblongata, which is the lowest part of the brain, contains the nuclei of the nerves serving the most

elementary and vital functions, including respiration, blood pressure, and the heart-beat.

These nuclei or centres are all paired, one on each side of the brain stem. They give rise to nerves running out of the central nervous system to connect it with the organs which they control. In the brain these are called cranial nerves, in distinction from the spinal nerves arising from the spinal cord. There are 12 pairs



Brain. Diagram showing main structures of the human brain

of cranial nerves, among them the olfactory nerves, giving the sense of smell; the optic nerves, connecting the eye to the brain; the oculo-motor nerves, controlling eye movements; the facial nerves which move the facial muscles; and the vagus nerve which helps to control the heart, blood vessels, and the digestive system. The lowest four lie in the medulla. Running up and down past each of the nuclei of the cranial nerves in the medulla are bundles of nerve fibres, or tracts, which convey impulses to and from the brain and spinal cord.

The pons varolii has a similar structure to the medulla, with paired cranial nerve nuclei, but it has developed specially to link the cerebellar lobes with each other and the rest of the brain and spinal cord. Its shape shows that it is a bridge between the two halves of the cerebellum. In it is a complicated system of nerve tracts linking the midbrain with the medulla and spinal cord, as well as connecting the cerebellar lobes with many other parts of the brain. All the other cranial nerves except the olfactory and optic nerves arise in it.

The midbrain is the highest and most highly developed portion of the brain stem. It is the meeting

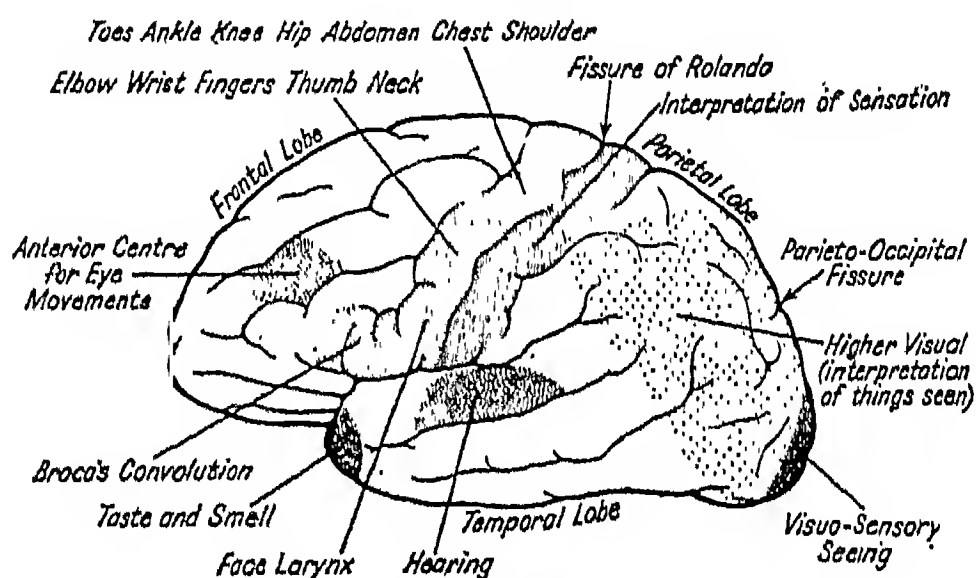
place of all the nerve tracts passing into the brain stem to and from the great cerebral hemispheres. As the tracts converge from these hemispheres they give the brain stem a triangular shape. In the middle of the inverted triangle so formed are small cell stations that govern many of the functions of the body which are performed unconsciously. Centres connected with the regulation of water in the body, of fat and sugar, with the development of male and female sexual functions, and with the rhythm of sleep, all lie here. Here also, in the upper part of the midbrain in an area, called the hypothalamus, are packed many little groups of nerve cells responsible for the normal development and functioning of the body. In spite of containing so many structures the whole of the brain stem is only about two inches long and less than an inch wide.

THE CEREBELLUM. The cerebellum lies behind the brain stem in the lowest part of the cranium, and it is underneath the posterior part of the cerebral hemispheres. It is made up of two large lateral lobes and a small central portion, each of which is connected by nerve fibre tracts to the brain stem. The cerebellum measures about four inches from side to side, and two and a half inches from before backwards. It consists of an outer grey layer and an inner white core. The whole of its surface is deeply grooved by fissures, the depth of which becomes evident only when the cerebellum is cut. Then it is seen that it is entirely constituted of elaborate folds, tightly packed together. When cut across, these folds are seen to divide and subdivide in the same way as the limbs of a tree. This results in an enormous increase in the area of the superficial grey matter in proportion to the volume of the cerebellum. The cerebellum is responsible for the unconscious coordination of voluntary movement.

THE CEREBRUM. The cerebrum, which has reached its highest stage of development in man, is by far the biggest portion of the human brain; in fact the word "brain" is used loosely in referring to it. It occupies all the cranial cavity above a line running from the middle of the eye through the ear to the occiput. Its upper and outer surfaces follow the convexity of the skull, and its under surfaces rest in front upon the bony base of the skull, and behind upon the fold of dura mater separating it from the cerebellum. In the

middle it lies above the upper part of the brain stem. The whole of the surface of the cerebrum is thrown into deep folds or convolutions, caused by indentations or fissures. These fissures run in many directions, but they have a fairly constant pattern; most have been described in great detail and have received special names. The more important of these fissures are: the great longitudinal fissure, which results in the separation of the cerebrum into two lobes; the fissure of Rolando, which separates the motor and sensory areas of the brain; the fissure of Sylvius, which separates the temporal lobe from the frontal and parietal lobes; and the calcarine fissure, in which lies the centre for sight.

The two cerebral hemispheres, separated by the great longitudinal



Brain. Diagram indicating functional centres

fissure in the middle line, are joined together at the bottom of this fissure by a thick and flat band of nerve fibres called the corpus callosum. This band spreads out into each hemisphere like a fan, and joins together the corresponding parts of the two sides. Below it two other great bands of fibres run out of the hemispheres and converge in the brain stem at the top of the midbrain, to join the cerebral hemispheres with the lower structures in the nervous system.

GREY AND WHITE MATTER. If one of the cerebral hemispheres is cut across it shows an outer layer of grey matter, the cortex, surrounding a mass of white matter; in the centre of the white matter are other masses of grey substance. The grey matter is made up chiefly of nerve cells and the white matter of the fibres which arise in these cells. Inspection of the cortex shows that the fissures and convolutions have caused a great increase in the surface area of the human cerebrum, and therefore there is a corresponding increase in the

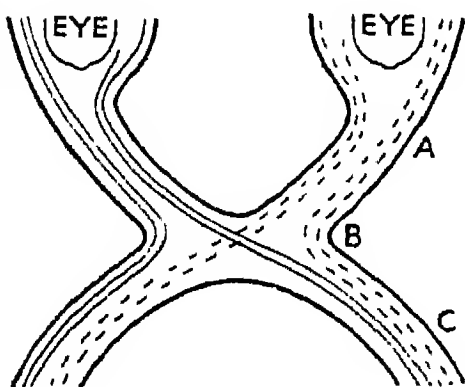
number of brain cells. If the brain of another animal is examined—for example, that of a dog or sheep—it is found that not only is it much smaller in proportion to the size of the animal, but also that the number and complexity of the convolutions are much less. As the size and the spacing of the nerve cells is about the same in different animals, it follows that the number of these cells is much greater in man than in other animals. It is therefore believed that these cells are the physical basis of human intelligence, will, and feeling, and that there may be some relation between cortical surface area and intellectual capacity.

The central grey matter is also composed of masses of nerve cells. These are divided into two large groups, the optic thalamus and the corpus striatum, together called the basal ganglia, which are primitive cell stations used in the transmission and coordination of impulses responsible respectively for sensation and voluntary movements. Between these two struc-

tures is a zone of white matter called the internal capsule, in which run all the fibres connecting the areas of the cerebral cortex controlling voluntary movement, sensation, and sight. Here a small area of damage can result in a very severe disability. The nerve fibres which have converged upon the internal capsule run down in a bundle to form the cerebral peduncle, part of the midbrain.

CRANIAL NERVES. When the under surface of the brain is examined, the same convolitional structure of the cerebral cortex is seen as is present over the convexity. The two hemispheres may be separated in front and behind, and in the middle the cerebral peduncles are seen running into the brain stem. The cranial nerves enter the brain in pairs. The first, the olfactory nerves, run backwards to encircle the top of the brain stem. These nerves begin in fine filaments in the roof of the nose and run to an area on the under surface of the brain responsible for the appreciation of smell. Below these are the two large optic

nerves, which run from the eyes and then undergo a peculiar division so that each nerve sends half its fibres to one side of the brain and half to the other side. The bands so formed then run a complicated course through the midbrain to the posterior region of the hemispheres where they enter the area of the cortex serving sight. By this arrangement of the optic nerves, the left half of the visual field of both retinas is represented in the left side of the brain and the right half on the right side of the brain. These two "double imprints" of the two halves of the visual field from



Brain. A. Optic nerve. B. Optic chiasma. C. Optic tract

slightly different angles are later fused into a single stereoscopic view in some way not understood.

Just behind the junction of the optic nerves is a small but important structure, the pituitary gland. The pituitary, one of the system of endocrine glands, controls many other endocrine glands. It plays an important part in deciding the rate of growth of the body, and of the development of sexual characteristics. Reduction of the activity of this gland in childhood will result in dwarfism, while a tumour on it may produce a giant.

The brain is actually a hollow organ, for through its structure is a central cavity—evidence of the tubular form that the central nervous system had during development, which remains in a much simpler form in the spinal cord. This cavity is very small in the spinal cord and brain stem, but it enlarges and assumes a tortuous shape in the cerebral hemispheres, where it constitutes the lateral ventricles of the brain. The purpose of the ventricles is to allow the circulation of a fluid secreted by some specialised blood vessels which lie in the cavity of the ventricles. This fluid passes through the ventricles downwards through the centre of the brain stem to emerge through an opening in the back of the medulla. From here it flows upwards over the surface of the hemispheres to be absorbed into veins which run in the great longitudinal fissure. The cerebrospinal fluid plays a part in the nourishment of brain cells, and it also acts as a protective water bath for the whole brain.

THE LOBES. The cerebral hemispheres are divided into four

large lobes—frontal, parietal, occipital, and temporal. Different functions of the brain are located in fairly constant positions on the surface of these lobes. Voluntary movement, sensation of touch or of the movement of joints, vision, hearing, taste, smell, speaking, and the understanding of speech all have special areas of representation, so that disorders of these functions make it possible to locate with accuracy the position of a disorder in the brain. Each cerebral hemisphere is responsible for the activity of the opposite side of the body. Voluntary movement

is initiated by nerve cells in the front part of the parietal lobe, along the anterior lip of the fissure of Rolando, while the appreciation of the position of the joints and of light touch depends upon a large area immediately behind this fissure.

The relative position in which each part of the body is represented in these areas is constant. The senses of smell and of taste are represented on the underside of the brain, vision on the occipital pole, and hearing in the middle of each temporal lobe. Speech also has special areas of representation, spoken, written, and graphic symbolism each having distinct areas. These areas are on the left side of the brain in right-handed persons.

There are much greater areas of the cortex from which no response can be obtained. These are called silent areas. The frontal lobe is an example. Although these large areas of the brain may seem inactive, their relatively great size in man has determined his dominance over other animals, for they are association areas responsible for the intricate integration of brain activity which results in thought, feeling, and purposive action. The "special" areas where senses are represented are intimately interconnected and have elaborate connexions with the association areas. It is the complexity of the association areas which forms the physical substratum of man's complex thought and activity. These association areas, consequently, represent the highest level of development of the brain. Other lower levels of function are those serving the special senses and those in the brain stem serving autonomic activity.

Each of the special areas of the brain serving voluntary movement, sensation, vision, and so on is surrounded by appropriate association areas. These areas enable the function concerned to be used in more intricate or intelligent ways than would otherwise be possible. For example, the motor speech area is just near the motor area for voluntary movement of the mouth and larynx, while the sensory speech area, damage to which prevents the recognition of words, is near the auditory and sensory areas on the left side. Immediately surrounding the visual area at the back of the brain is an area of cortex concerned with the recognition of the objects seen.

The frontal lobes are the largest in the brain, and they are known to be responsible for the higher levels of thought and behaviour. Damage to these lobes may cause a serious change in the personality, an individual who has previously been responsible and conscientious becoming casual and irresponsible, and losing the capacity for sustaining a continuous train of thought. This aspect of the function of the frontal lobes has been used in the treatment of mental disease. In abnormally depressed or obsessional people, a simple operation to cut the nerve fibres of the frontal lobes may produce a dramatic relief and improved behaviour.

THE NEURONES. The functional unit in the brain is the nerve cell or neurone. This has a body a few thousandths of an inch across, with an elaborate network of fine branching filaments or dendrites. These intermingle with the dendrites of other cells and so bring about the continuity of function which is characteristic of the central nervous system. In each cell one of these filaments is longer than the others, and in some instances it is very long indeed. Thus the cells in the motor area of the cortex which are responsible for the movement of the head, body, and limbs on the opposite side have fibres which leave the minute cell body and pass into the white matter. Going through the internal capsule, they enter the brain stem and travel right down the spinal cord, where at the appropriate level they make contact with another motor cell which sends a similar fibre right out to the muscle. The fibres which arise in the lower part of the cord pass right down to the toes. Every part of the brain is interconnected

by such fibres. Short ones join adjacent cells, or cells in the same convolution of the surface of the hemisphere. Larger ones join adjacent convolutions, commissural fibres join the two hemispheres, and projection fibres extend right down into the spinal cord.

Conduction in these nerve fibres is mediated by a rapid electrical change which travels down the nerve fibre. At the end of the fibre it produces a chemical change which influences the endings of the next fibre and so sets up a similar impulse in that fibre. The electrical change lasts for less than a hundredth of a second, but the rate at which it travels down the nerve fibre varies considerably. In general, the higher the function the faster the rate of conduction in the nerve.

Another form of electrical activity is peculiar to the brain. When electrodes are placed on the scalp in man and in other animals an oscillating current can be recorded. The most usual frequency of this current is about ten a second. This rhythm disappears if the subject's attention is engaged, particularly by seeing or by thinking. It arises in the back part of the brain, on both sides, and is thought to be produced by the process of living of brain cells. The pattern of the electrical activity changes if the brain is damaged, *e.g.* by a tumour or a blow, and it assumes a characteristic form in some special disorders, *e.g.* epilepsy. This fact has proved of great value in studying the diseases to which the brain is susceptible. The rhythms are recorded upon an instrument called an electro-encephalograph. These waves of electrical change are different from the rapid electrical changes, or action currents, which arise when a nerve is conducting impulses, and they do not, therefore, reflect the working so much as the state of living of the brain.

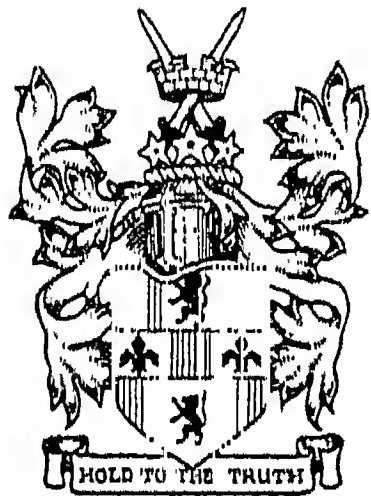
Brain, DENNIS (b. 1921). British horn player of world-wide reputation. A member of a family of musicians, he was born in London, May 17, 1921, the son of a well-known horn player, Aubrey Brain (1893-1955), with whom he later studied at the



Dennis Brain,
British horn player

R.A.M. Dennis Brain appeared first in 1938, and became principal horn player of the Royal Philharmonic and the Philharmonia orchestras. He performed as a soloist at the Lucerne festival, 1948, and was the second soloist in Strauss's second horn concerto, performed in Vienna 1948. Hindemith and Gordon Jacob dedicated concertos to him; Benjamin Britten dedicated to him his *Serenade for tenor and horn*.

Brains Trust. Term originally applied by a writer in the *New York Times* in July, 1932, to a much publicised group of experts on law, economics etc., who advised Franklin D. Roosevelt during his first presidential election campaign and helped him to formulate his "new deal." The term came to be adopted in Great Britain for a B.C.C. programme originally called "Any Questions" in which experts gave impromptu answers to questions submitted by listeners. The first of these programmes was broadcast Jan. 1, 1941. Dropped from sound broadcasting in 1949, the programme was revived on television in 1955.



Braintree and Bocking
arms

Braintree and Bocking. Urban district and market town of Essex, England. It lies between the Brain and Blackwater rivers, 11 m. N.N.E. of Chelmsford. Silk weaving was introduced here by Huguenot settlers in the late 17th century, and fine silks, brocades, and velvets continue to be woven, as well as synthetic yarns. Other manufactures include steel casements, motor accessories and tools, and brushes. The two parishes of Braintree and Bocking (which is a Peculiar, *q.v.*) were united to form one urban district in 1934; both have fine parish churches. Many of the amenities of the town have been provided by members of the Courtauld family. Market day, Wed. Pop. (1951) 17,481.

Braithwaite, JOHN (1797-1870). British engineer and railway pioneer. Born in London, March 19, 1797, he was a son of John Braithwaite who recovered the guns of the *Royal George* (*q.v.*) in 1782. Succeeding to his father's engineering works, he made a speciality of high-pressure engines. The ventilation of the house of lords in 1820, by means of air pumps, was due to him, as also was

the introduction of the donkey engine and donkey pump. With Captain John Ericsson, the Swedish engineer, Braithwaite designed and built,



John Braithwaite,
British engineer

1829, for the Liverpool and Manchester railway, the Novelty locomotive, the first to run a mile within a minute. He designed and built the first practical steam-powered pump for a fire-engine: it was used at a fire at the Argyll Rooms, 1830, and at the burning down of the houses of parliament, 1834. He laid out the Eastern Counties railway, several lines in France, and Langstone harbour, Hants. He died Sept. 25, 1870.

Braithwaite, DAME LILIAN (1873-1948). British actress whose acting was noted for its flexibility and sense of drama. Born at

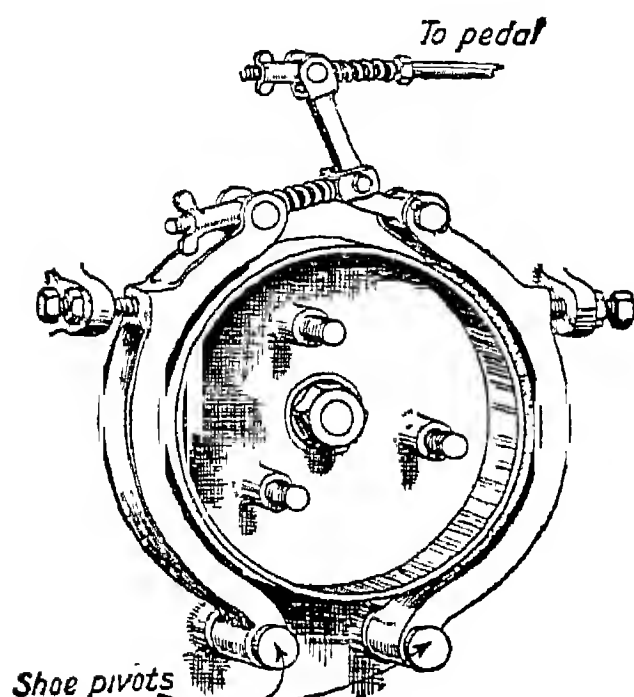


Dame Lilian Braithwaite,
British actress

Ramsgate, March 9, 1873, she was educated in London and at Dresden. She first acted professionally in South Africa, 1897, and three years later made her debut in London in *Sweet Nell* of Old Drury, at the Haymarket Theatre. Subsequently playing in Shakespeare with Benson, and in contemporary plays with various famous actors, she maintained with distinction a high position on the British stage, appearing with success in tragedy and comedy. Plays in which she made later notable appearances included *Mr. Wu*, 1914; *The Vortex*, 1924; *The Silver Cord*, 1927; *The Truth Game*, 1928; *Fresh Fields*, 1934; *Arsenic and Old Lace*, 1942-46. Created D.B.E. 1943, she died Sept. 17, 1948.

Brake. Contrivance for diminishing speed or bringing a moving object to a standstill. On road vehicles the block brake, still used for vehicles which are not self-propelled, is the simplest form. A block of wood or metal shaped to the curvature of the wheel is brought against the tread by levers operated by a hand-lever. The brake-block is faced with material that has good gripping power and does not easily heat up. The invention of rubber tires made it necessary to abandon the

block brake in favour of a form which could act on or inside a drum fixed to the hub of the road wheels. There are two main forms which were sometimes used together: (a) the external band brake, embracing the drum and contracted against the surface of the latter by a linkage of levers



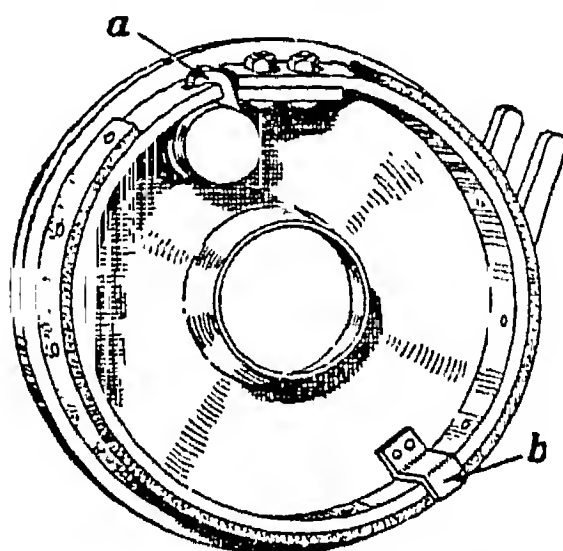
Brake. Fig. 1. Early type of external contracting brake for motor cars, acting on transmission

(Fig. 1); (b) the internal expanding brake (Fig. 2), in which two shoes, shaped to conform to the curvature of the inside of the brake drum, were expanded against the latter when the brake-operating lever was moved. Type (a) came into use for brakes on such machines as cranes, hoists, and lifts; the internal expanding brake is used in much other machinery. Specialised brakes were developed for pedal cycles and motor cycles. In the early bicycle a plunger brake acted against the tread of the pneumatic tire. It was soon superseded by a brake which gripped the rim of the bicycle wheel, the modern form being exemplified by the calliper-brake. An external expanding brake was incorporated in the shell of the back wheel, combined with (1) a free-wheel device or (2) a three-speed gear.

For motor cycles brakes of types (a) and (b) mentioned above came into use, and these were the standard forms on most motor vehicles for a long time. In order to keep pace with the increasing speed and power of such vehicles a dual brake comprising a contracting band on the outside of a drum with an internal expanding brake acting against the inside was devised. The fitting of brakes to all four wheels of a motor car was another development, involving a flexible linkage to the front (steerable) wheels.

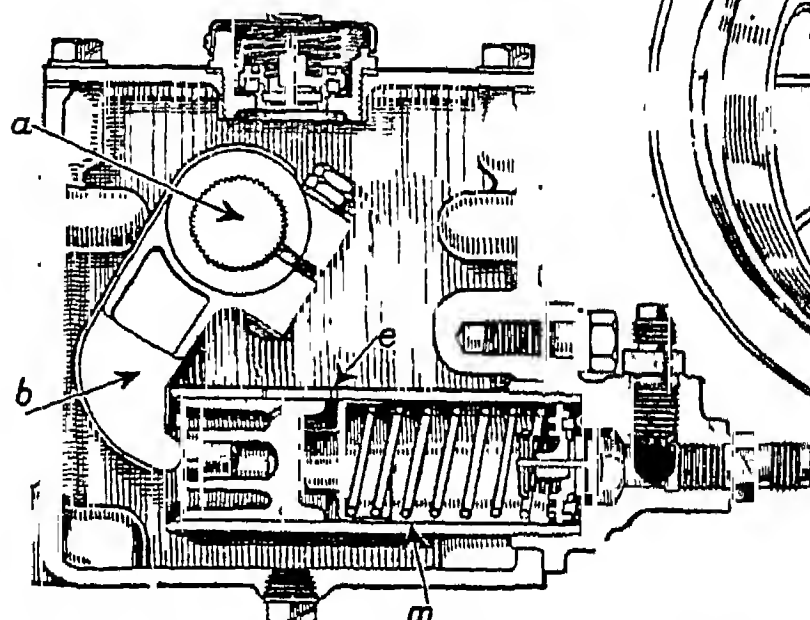
Hitherto the braking force had been provided by the movement

of a hand lever or the depression of a pedal, the mechanical advantage being increased by the linkage of rods and levers. Hydraulic linkage between the brake-operating lever or pedal and the actual braking mechanism was one device to improve power and efficiency; an early type is shown in Figs. 3 and 4. Depressing the pedal caused a pump plunger to force oil through tubes to the brake drums, in each of which a double-ended cylinder was positioned so that its two pistons expanded the internal brake shoes. The next step was the harnessing of some



Brake. Fig. 2. Early type of internal expanding brake for motor cycle; a, operating lever; b, centralising bracket

external power which, when the driver operated the brake pedal, supplied the braking force—controllable as to degree by the pedal. By now the brake was taking on somewhat of the form of a clutch (*q.v.*), as commonly used in machinery for bringing about connexion to a source of power. Servo mechanism of differing form was then introduced to augment or supersede the manual effort required to actuate the brakes. In some types a



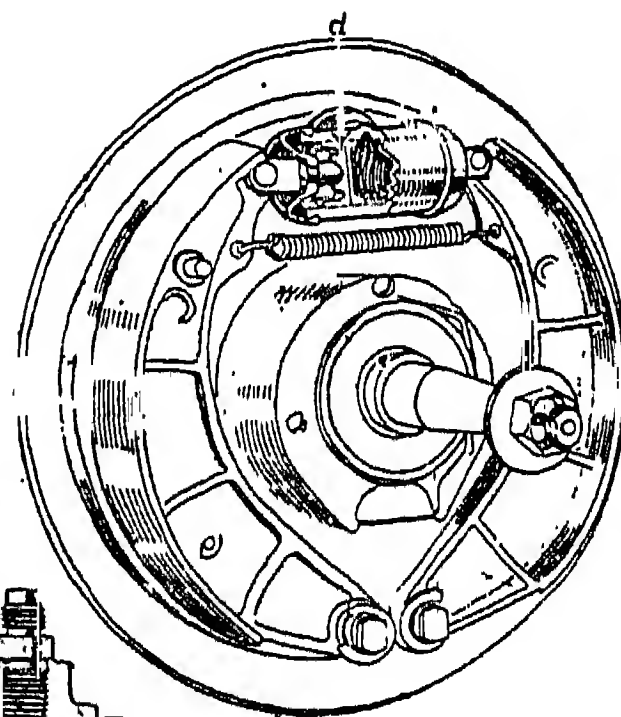
Brake. Fig. 3. Lockhead hydraulic brake for motor car. a, spindle; b, lever; c, hole for oil percolation; m, cylinder. Fig. 4 (above right). Brake shoes and operating cylinder with two pistons, d

servo action was obtained from the rotation of the brake drum, which caused the band or shoes to

grip the drum with greater force. In one system an electro-magnet servo was used. Rotating with and fixed to the brake drum was an armature which was gripped by a concentric magnet system energised when the brake pedal was depressed. Yet another system utilised a vacuum, produced by the engine exhaust, to supply the servo power.

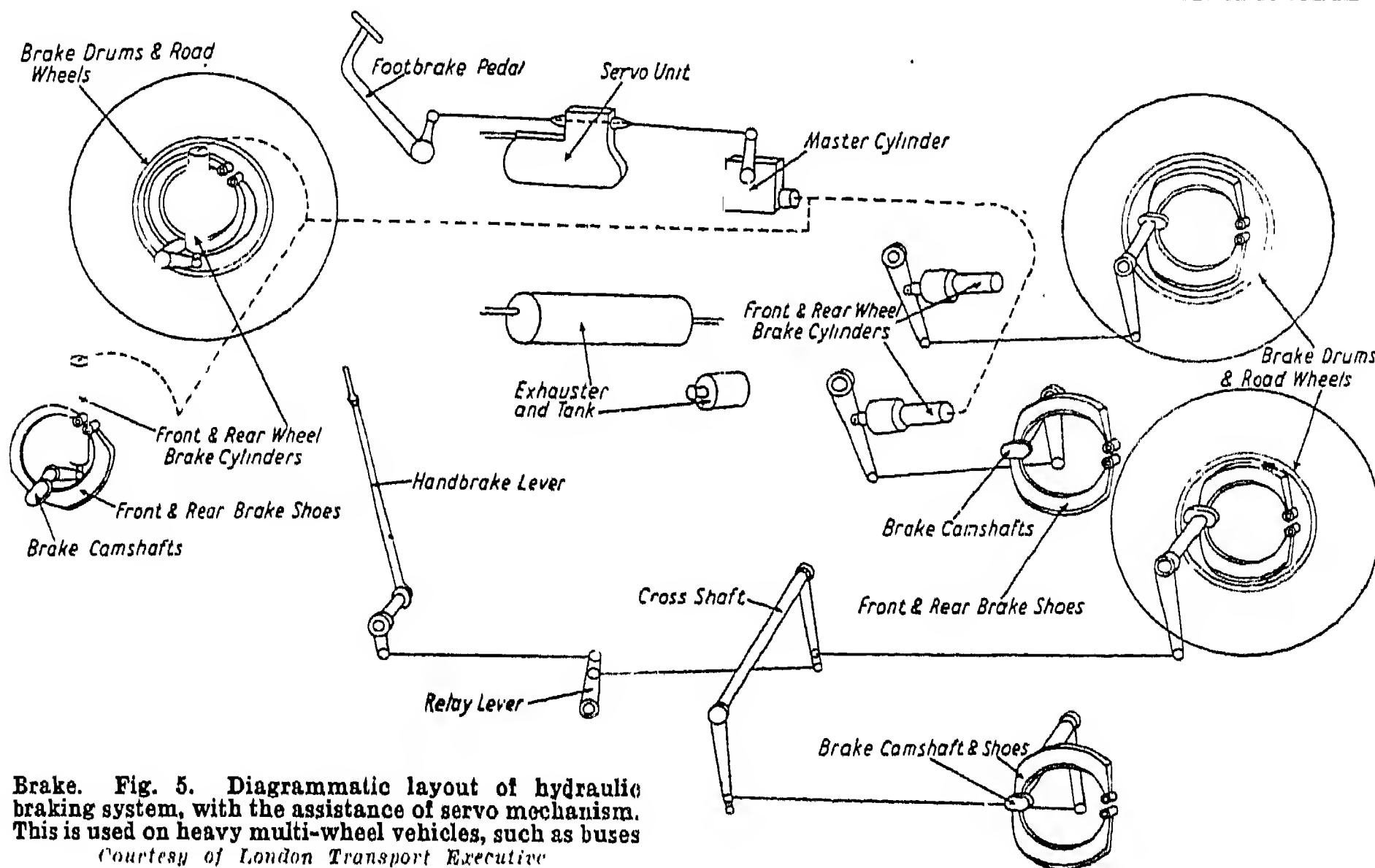
Heavy multi-wheel commercial vehicles were fitted with brakes on four or more wheels, hydraulically operated (Fig. 5), or actuated by pneumatic apparatus. In addition, another set of brakes acting on four wheels might be hand-applied. On steam-driven wagons a steam brake came to be fitted. The use of one or more trailing vehicles introduced the problem of synchronous operation of trailer brakes with the main vehicle brakes, overcome by flexible linkage.

RAILWAY BRAKES. Block brakes working on the tread of the flanged wheels are used on railway rolling stock. At first simple hand-lever brakes were used, resembling those fitted to goods wagons today. For the engine and tender a worm-and-lever brake came into use, like that used on the brake vans of goods trains. George Stephenson (*q.v.*) installed a steam brake on his early locomotives; the brake-operating lever being moved by the piston of an independent cylinder. He also introduced a brake applied by the spring buffers



of the wagons when the engine, with steam shut off, ceased to haul. This last device was taken further by later inventors but never came into extensive use. It

was early realized that the great need was for a "continuous" brake, acting on all the wheels of



Brake. Fig. 5. Diagrammatic layout of hydraulic braking system, with the assistance of servo mechanism. This is used on heavy multi-wheel vehicles, such as buses
Courtesy of London Transport Executive

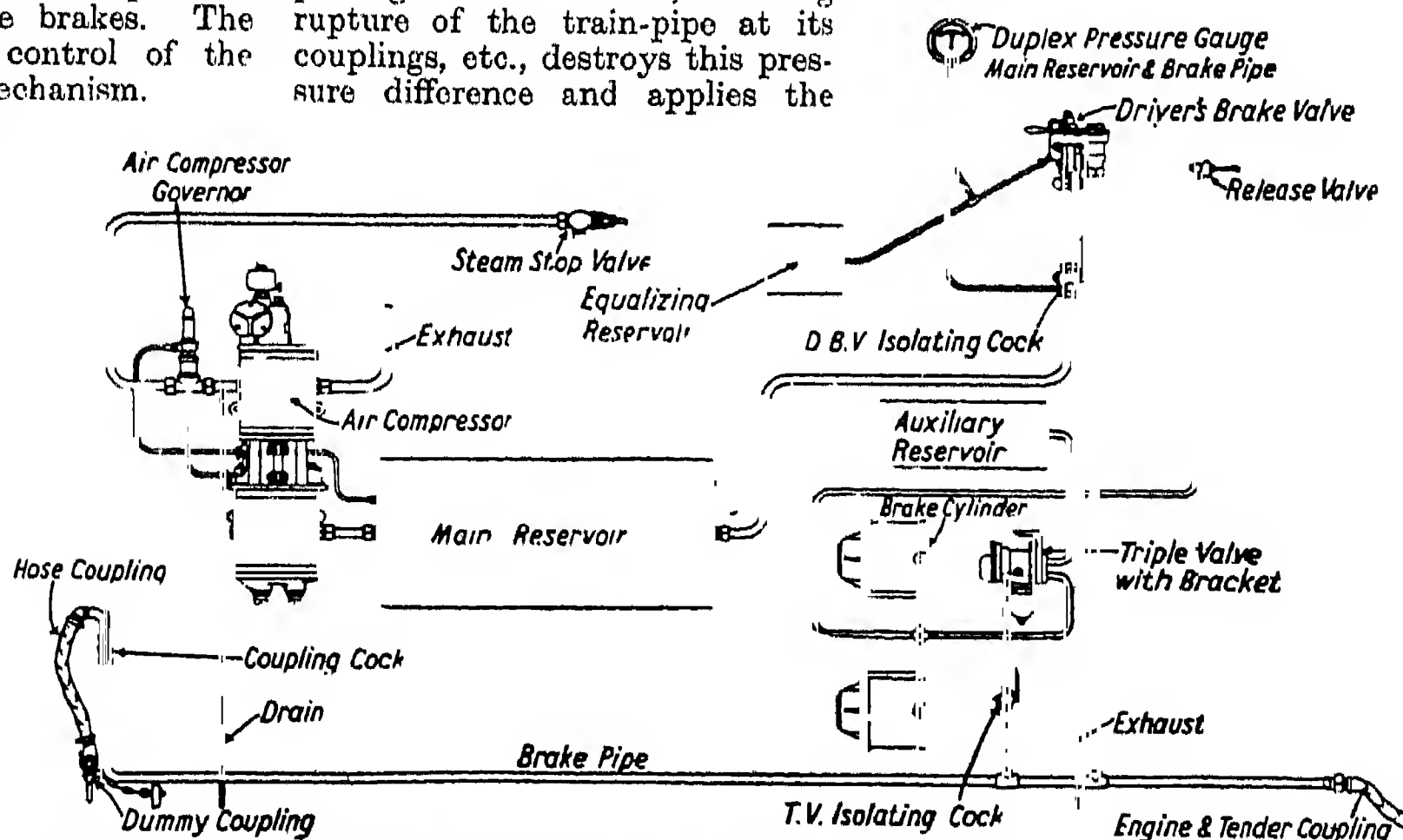
a train simultaneously. The chain brake, introduced about 1870, was a step in this direction. A friction pulley was fixed to the wheel axle under the guard's van; a loose friction pulley, with a drum attached, was fixed to a framework under the van in such a manner that the guard, by working a lever, could bring the loose pulley into frictional contact with the pulley on the wheel axle, and so drive the brake pulley. To the drum of the latter a chain was fixed, connected to all the brake levers of this section of the train; the chain, on being wound upon the drum, applied the brakes. The driver also had control of the brake-applying mechanism.

In 1869 George Westinghouse, of Pittsburgh, Pa., fitted his air brake on the first train to go into regular service so equipped. It was a "straight" air brake, not automatic in action. In 1887, after much further development, Westinghouse produced his quick-action automatic brake, embodying an improved "triple valve"—a piston apparatus which was the kernel of

the whole apparatus. This was in the course of extensive brake trials at Burlington, U.S.A. In Great Britain similar trials had been made at Newark, over part of the Midland Railway's track in 1878. The Westinghouse and a vacuum brake invented by Smith were the only serious competitors. Both types, following continual development, thereafter held the field. In both continuity is secured by connexion to a train-pipe and associated vessels in which a state of pressure or a partial vacuum is maintained; the parting of the train, causing rupture of the train-pipe at its couplings, etc., destroys this pressure difference and applies the

brake. The driver or guard can apply the brakes by opening a cock; passengers can apply them (partially, at all events), by operating an emergency handle in the coaches.

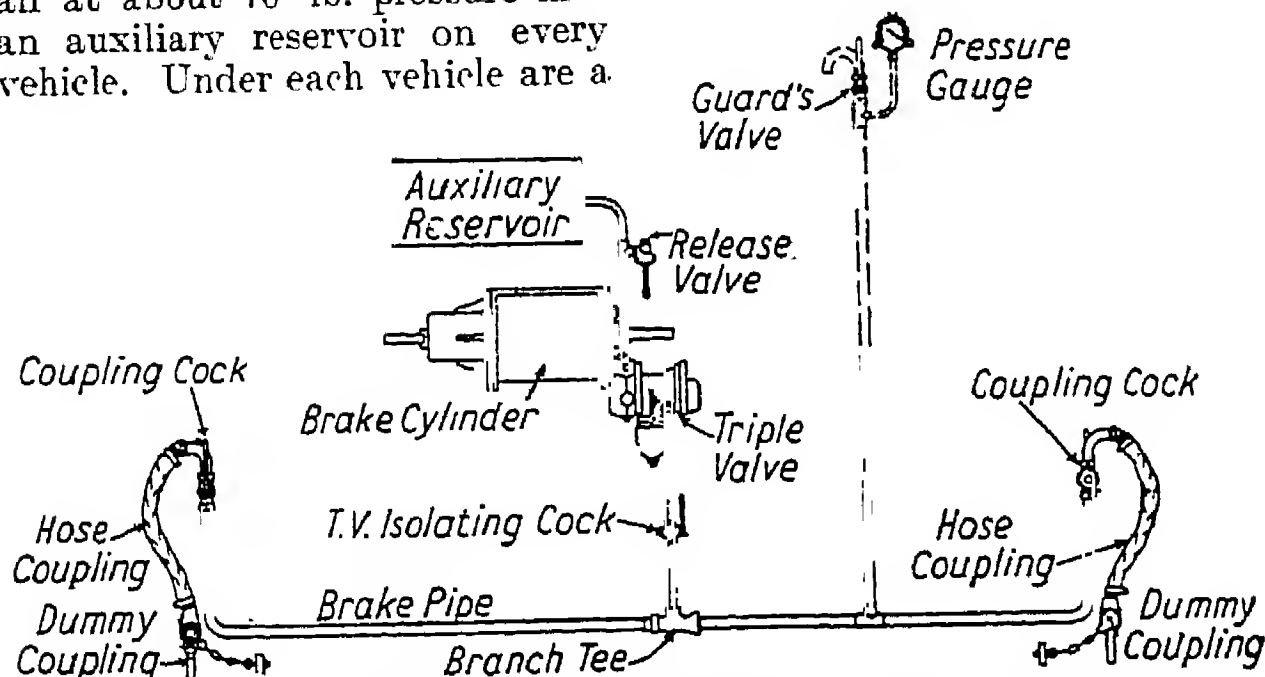
The necessary air pressure for the Westinghouse brake is produced on steam locomotives by an auxiliary engine; on electric trains a motor-driven compressor is used, automatically put into operation or cut out by changes in the pressure of the air in the brake pipes. The operation of the Westinghouse brake is as follows.



Brake. Fig. 6. Westinghouse automatic railway brake: diagram showing engine fittings of this brake on an engine with tender. Its operation is described in the text
Courtesy of Westinghouse Brake & Signal Co., Ltd.

(See figs. 6 and 7.) The compressor delivers air into a main reservoir at a pressure of about 100 lb. per sq. in. It also delivers air at about 70 lb. pressure into an auxiliary reservoir on every vehicle. Under each vehicle are a

To apply the brakes, the vacuum in the train-pipe is lowered by admitting air, which finds its way to the under side only of the piston,



Brake. Fig. 7. Westinghouse automatic railway brake, showing arrangement of fittings on passenger vehicle. Engine fittings are shown in fig. 6

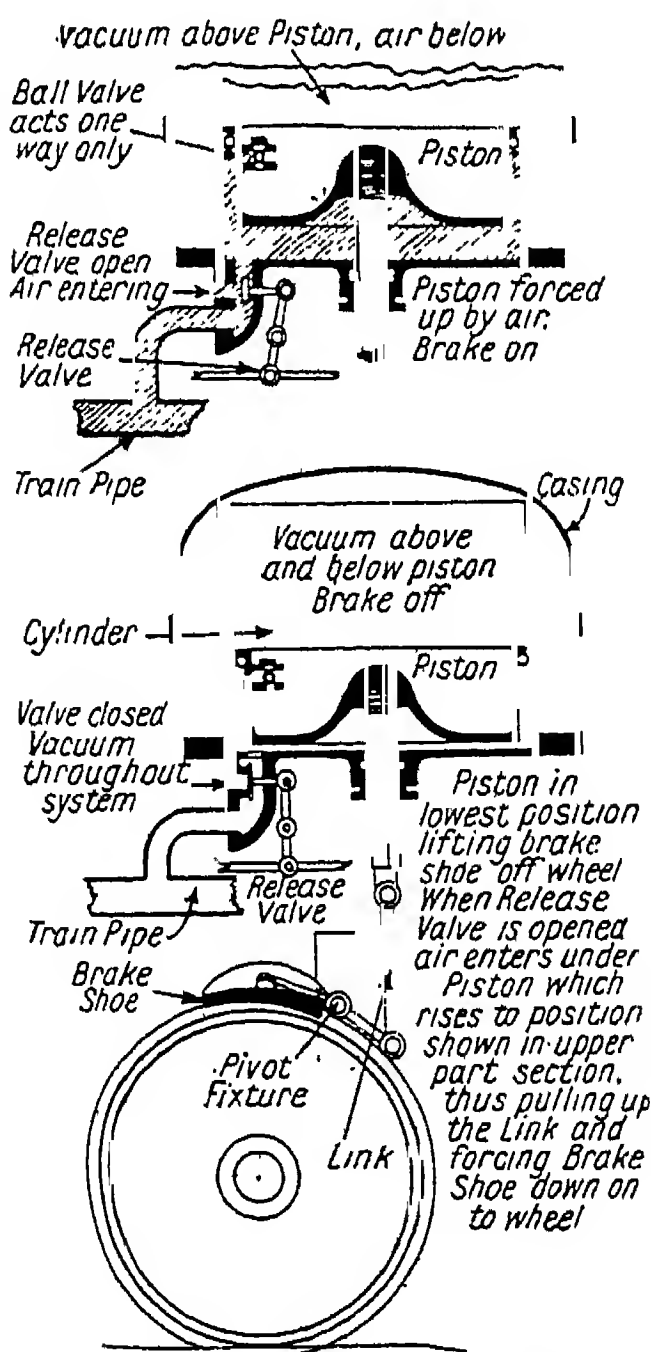
brake cylinder, a piston and rod, a separate chamber for compressed air, and a triple valve. The function of this valve is to put the brake cylinder in communication with the open air or with the reservoir, and the reservoir in communication with the cylinder or the train-pipe. When the brakes are off, the brake piston is pushed in by a spring, and the cylinder is open to the air while the reservoir is open to the train-pipe, fed with compressed air from the main reservoir on the engine. A pressure of about 70 lb. per sq. in. is maintained in the train-pipe and auxiliary reservoirs.

To slow the train, the driver reduces the pressure in the train-pipe, causing a port to open in the triple valve, which admits compressed air to the brake cylinders. To pull the brakes off, the original pressure is restored in the train-pipe by closing the vent and admitting compressed air from the main reservoir.

In the vacuum automatic brake (fig. 8) there is under every carriage a vacuum chamber. Inside the chamber is a cylinder open at the top and closed at the bottom. A pipe connects the vacuum chamber through a non-return valve and, independently, the lower end of the cylinder to the train-pipe which runs from end to end of the train. Air is exhausted from the train-pipe and from the spaces above and below every brake piston equally, the non-return valve offering no resistance to air moving outwards from the vacuum chamber. When the pressure on both sides of a piston is equal, the piston falls by its own weight, and releases the brakes.

as the valve prevents its entering the vacuum chamber. The piston then rises with a force proportionate to the difference between the pressure on the upper and lower sides, and the brakes go on.

ELECTRO-MAGNETIC BRAKES. Brakes on early tramcars were simple block brakes applied by a



Brake. Fig. 8. Vacuum brake for railways. Release valve can be operated by engine driver or guard. Breakage of train-pipe has same effect as opening release valve; air enters system as shown by shading, and the brake acts automatically

worm and lever. Following the introduction of electricity as motive power, magnetic slipper brakes were installed. These were thrust down on to the rails by the action of a solenoid (*q.v.*) when energised, so exerting a drag and slowing down the vehicle. Electro-magnetic block brakes applied to the wheels were introduced, gripping the treads by magnetic attraction. A very powerful braking force was obtained in electric trams and trains by arranging to change the connexions of the wiring to the motors so that the motors, under the acquired momentum of the vehicle, functioned as generators in what is called regenerative braking, the drag of the field-magnet system then aiding in stopping the car, bus, or train.

AIRCRAFT BRAKES. Friction brakes are fitted to landing and nose wheels of aircraft. The landing wheel brakes can be operated independently at low speeds for steering. Aircraft brakes must have a high rate of energy absorption and are sometimes operated pneumatically by inflatable rubber tubes which press against the brake shoes. Another form of aircraft brake is the disk-type, in which the motion of a rotating disk, clamped to the wheels, is retarded by stationary plates pressed against its side surfaces. Automatic braking is fitted to some aircraft, in which the brake pressure is controlled by a flywheel set in motion by the rotation of the landing wheel. The flywheel reduces the pressure between the brake disks when the landing wheel skids.

Bramah, ERNEST. Pen-name of Ernest Brammah Smith (1868–1942), British novelist, creator of the Chinese sage Kai Lung. Born at Hulme, Manchester, March 20, 1868, he worked at farming c. 1887–94, publishing a book on this subject in 1894. In 1900 appeared his first work of fiction, *The Wallet of Kai Lung*. This book of tales recounted the views and adventures of a Chinese sage in prose that was eloquent, witty, and ripely wise, but had a flowery, magniloquence not suited to all tastes. It was followed by many more in the same vein, for which Bramah found a faithful public. He also wrote a popular series, beginning with *Max Carrados* (1914), about a blind detective. He died June 23, 1942.

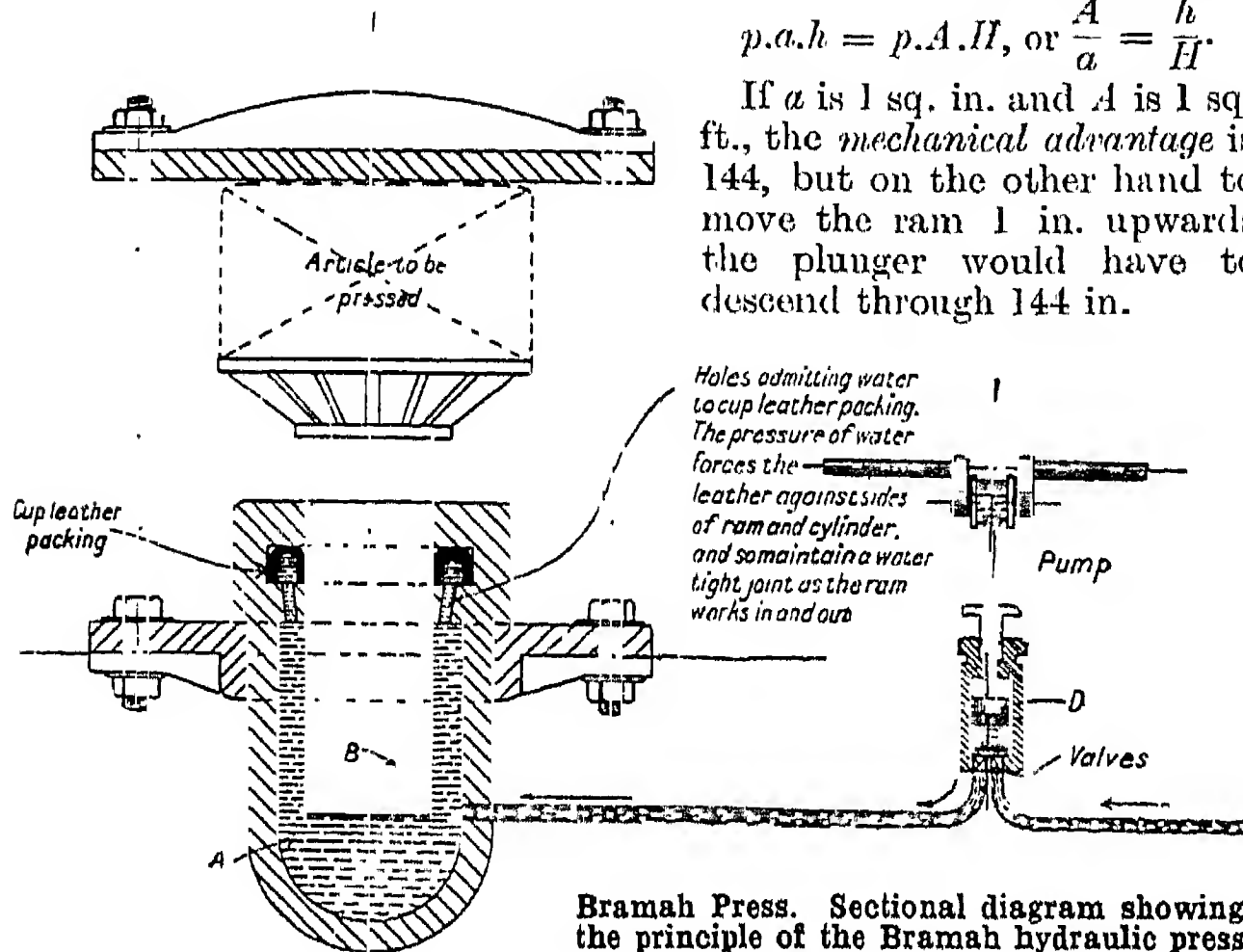
Bramah, JOSEPH (1748–1814). British inventor of the press bearing his name. Born at Stainborough, near Barnsley, Yorkshire,

April 2, 1748, the son of a farmer, he served an apprenticeship to a carpenter, and moved to London, where he began business as a cabinet maker. Of his 18 patents, the first, 1778, was concerned with the improvement of water-closets. He also designed a new type of lock, a beer engine, and a machine for numbering bank notes. His

the pump plunger, this ratio being the *mechanical advantage*. If, to force the ram H in. upward, the plunger must descend h in., the velocity ratio is said to be $\frac{H}{h}$. Assuming there is no loss of energy in the system, the work done by the plunger equals the work done on the ram, and, if p is the fluid pressure,

$$p \cdot a \cdot h = p \cdot A \cdot H, \text{ or } \frac{A}{a} = \frac{h}{H}$$

If a is 1 sq. in. and A is 1 sq. ft., the *mechanical advantage* is 144, but on the other hand to move the ram 1 in. upwards the plunger would have to descend through 144 in.



most important invention, the hydraulic press (*v.i.*), was patented in 1795. He died in Pimlico, London, Dec. 9, 1814.

Bramah Press. Hydrostatic device for magnifying force. According to Pascal's law, liquid contained in a closed vessel transmits equally in every direction any pressure per sq. in. imparted to it. Joseph Bramah (*v.s.*) applied this principle to the hydraulic press. In a metal cylinder A a ram B works up and down, a watertight joint being maintained by means of a cup leather washer. The cylinder A is connected by a pipe to a force pump containing a piston or plunger D of small diameter. By means of this plunger water is forced into the large cylinder A.

When the plunger of the pump is forced down, the liquid transmits the pressure to the cylinder A, and this pressure, transmitted in all directions without diminution per sq. in., forces the ram upwards. Thus the total pressure on the ram is to the total pressure of the pump plunger as the area of the base of the ram is to the area of the pump plunger.

If the area of the plunger is a sq. in. and the area of the ram is A sq. in. the total pressure on the ram is $\frac{A}{a}$ times that exerted by

An adaptation of the principle is exemplified in an hydraulic jack, by means of which a weight of over a hundred tons can be lifted by one man pressing on a lever and forcing a small quantity of liquid into the cylinder at each stroke through a non-return valve. Power-driven pumps are used for large Bramah presses.

Bramante, DONATO (1444-1514). Italian architect and painter. Born at Castel Durante, near Urbino, he lived at Milan c. 1480-99, and shortly after moved to Rome, where, in 1506, he was charged by Julius II with the plan and reconstruction of S. Peter's. Bramante died at Rome, March 11, 1514, before the work was completed.

Brambanan. Ruined town of Java, Indonesia, situated 15 m. by rly. S.W. of Surakarta. It has magnificent remains of Buddhist temples, monasteries, etc., built of hewn stones without mortar. Around a central temple are five squares formed of shrines and cells, with carved figures of mythological characters.

Bramber. Village of Sussex, England, 9 m. N.W. of Brighton, on the Adur. Former centre of one of the six rapes of the county, it was important in the Middle Ages when the estuary of the Adur reached as far as Steyning, 1 m.

N.W. The remains of the Norman castle of the de Braoses (to whom William I committed the lordship of the rape) tower upon an isolated bluff of cliff. This ruin was purchased by the National Trust for £2,900 in 1945. There is a small adjacent church, probably of the early 12th century, long since shorn of its transepts and chancel. A small museum of stuffed animals was collected by Walter Potter (1835-1918), a village naturalist who is buried in Bramber churchyard. Pop. (1951) 316.

Bramble OR BLACKBERRY (*Rubus fruticosus*). Prickly shrub of the family Rosaceae. It is a native of Europe, Asia, and N. Africa. The stout stems climb to the top of bushes with the aid of their numerous prickles, and then bend over till they touch the earth, when their tips root and give rise to new plants. The leaves are divided into three or five more or less oval leaflets. The pink or white flowers are produced in clusters at the end of side shoots, and are succeeded by a number of one-seeded drupes crowded upon a conical receptacle. At first hard and green, they become succulent, purple-black, and edible when ripe.

Bramble, COLONEL. Central character of the first novel of the French writer, André Maurois (*q.v.*), *Silences du Colonel Bramble*, published 1918. The character represents an admiring and observant Frenchman's typification of the British army officer of the First Great War. He is a Scotsman, whose chief superficial characteristic is philosophic taciturnity. He reappeared in a later novel, *Les Discours du Docteur O'Grady*, 1920.

Brambling OR MOUNTAIN FINCH (*Fringilla montifringilla*).



Brambling Finch, male specimen

Small bird akin to the chaffinch, but larger. Common in N. Europe, and a native of Scandinavia, Siberia, and Lapland, it is a winter visitant to Great Britain. Its song is a monotonous chirp.

Bramhall, JOHN (1594-1663). English divine. He was educated at Sidney Sussex College, Cambridge, and was ordained in the Church of England, 1616. In 1633 he went to Ireland as chaplain to Wentworth, and in 1634 was made bishop of Derry. His vigorous policy against the Ulster Covenanters and Puritans caused his

impeachment and imprisonment by the Irish Commons on the fall of Strafford. Liberated by Charles I, he retired to France and the Spanish Netherlands during the Commonwealth, and at the Restoration was made archbishop of Armagh. His High Church standpoint was as hostile to Rome as to Puritanism, but his relations with the Ulster Presbyterians improved before he died, June 25, 1663.

Bramham Moor. Locality in the W. Riding of Yorkshire, England. It lies S.W. of the Tadcaster and Wetherby road. Here on Feb. 19 or 20, 1408, Henry Percy, 1st earl of Northumberland, was slain in battle against the forces loyal to Henry IV. Bramham Moor is also the name of a hunt of which the 6th earl of Harewood (*q.v.*) was sometime master.

Bramley, FRANK (1857–1915). British artist. Born near Boston, Lincolnshire, May 6, 1857, he was trained at the Lincoln school of art and at Antwerp and Paris. In 1884 he began to exhibit at the Royal Academy. His best known picture, *A Hopeless Dawn*, now in the Tate Gallery, was shown in 1888. A member of the Newlyn school, he was made A.R.A. in 1894, R.A. in 1911. He died Aug. 10, 1915.

Brampton, HENRY HAWKINS, BARON (1817–1907). British judge. Born at Hitchin, Sept. 14, 1817, he was educated at Bedford School. He was called to the bar in 1843, and appointed a judge in 1876. He made his name in the Tichborne case (*q.v.*). He retired in 1898, was made a baron in 1899, and died without an heir Oct. 6, 1907. A Roman Catholic from 1898, he founded a chapel in Westminster Cathedral. He published a vol. of reminiscences in 1904.

Bran. The husk produced by the milling of grain. The outer coat of the ear, it contains, as does the germ, the vitamin B complex. The absence of this vitamin is the cause of beri-beri (*q.v.*) and is associated with pellagra (*q.v.*).

Bran. Dog of Fingal or Finn, the hero of Gaelic tradition. According to the legend Bran was a deerhound of fairy or elfin origin, and was found by Fingal in a giant's lair in a nest containing three puppies. Fingal carried off the nest, threw out two pups to appease the mother, and kept the third, which grew into a powerful dog, wonderfully fleet of foot, and was killed in a fight with a dog belonging to a southern chief.

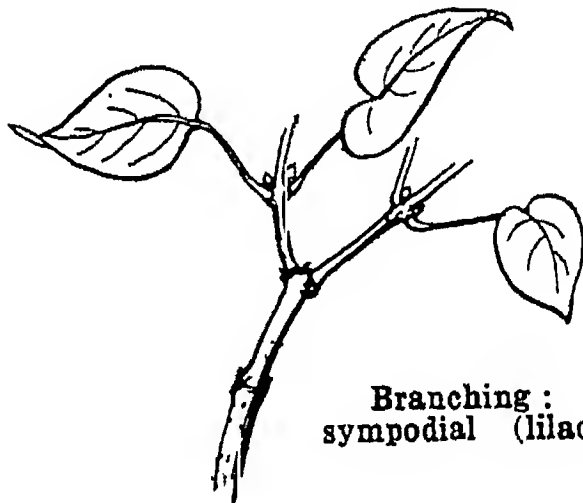
Branchidae OR DIDYMA. Ancient Ionian town on the W. coast of Asia Minor. Site of the cele-

brated oracle and temple of Apollo said to have been founded by his son Branchus, it lay 60 m. S. of modern Izmir (Smyrna). The oracle was in the hands of the hereditary priesthood, the Branchidae, claiming descent from Branchus.

Branching. In botany, the way in which lateral branches are formed from the main stem. At the beginning of the growing season the lateral shoots and main shoot all terminate in a bud (terminal bud) and bear other buds (lateral or axillary buds) along their length. The lateral buds were formed in the axil of a leaf, the scar of which can be seen beneath the bud. If the terminal bud develops and prolongs the main axis, growth is said to be monopodial, and here the lateral branches are formed in whorls of one, two, or more from the axillary buds. If the terminal bud aborts, then growth is said to be sympodial, since development is carried on by one or more of the lateral buds, and results



Branching :
monopodial
(spruce)



Branching :
sympodial (lilac)

in forked branching. Roots branch in a different, but regular, manner. Lateral roots are produced in a number of ranks along the root, the oldest being at the base (*i.e.* nearest the stem) and the youngest nearest the root tip.

In the lower plant groups, especially in some of the algae and liverworts, a forked type of branching occurs by the splitting of the growing point at the tip of the thallus into two equal parts. Each of these new growing points produces new cells, and the process, called dichotomy, is repeated many times.

Branchiopoda (Gr. *branchia*, gills; *pous*, foot). Sub-class of crustaceans, comprising the more

primitive members. The majority are completely or partly enclosed in a thin and transparent envelope, and bear a large number of limbs chiefly respiratory in function. Most Branchiopods frequent fresh water: *e.g.* *Daphnia*, the water-flea; but some are found in brine: *e.g.* *Artemia*, the brine-shrimp.

Brancker, SIR WILLIAM SEFTON (1877–1930). British soldier and aviator. Born March 22, 1877, he passed from Woolwich into the Royal Artillery in 1896. He served in the South African War, 1899–1902, and was in India 1903–12. While there he began to fly, and at the outbreak of the First Great War was appointed deputy director of military aeronautics. Later he was director of air organization and commander of the R.F.C. in the Middle East. Knighted in 1919, he became director of civil aviation, 1922. He was British representative on the international commission of air navigation. He was killed in the R101 (*q.v.*) disaster Oct. 5, 1930. *Consult* Life, N. Macmillan, 1935.

Branco, Rio (Port., white river). River of N. Brazil. Rising close to Venezuela in the Parima Mts., it flows S. and joins the Rio Negro, a branch of the Amazon. Some 374 m. long, it is navigable by vessels of light draught for most of its length.

Branco, CAMILLO CASTELLO (1825–90). Portuguese author. A native of Lisbon, he contributed to many of the leading journals of Portugal. His books include *Carlota Angela* and *Amor de Salvação*. He has been styled "a master of the Portuguese language."

Brancovan, CONSTANTINE (1654–1714). Prince of Wallachia. Belonging to a distinguished Rumanian family, he became prince of Wallachia in 1689. His attempt to become independent of Turkey by alliances with Austria and Russia were frustrated by the Turkish government, by which he was deposed, he and his four sons being executed Aug. 26, 1714.

Brand, SIR JAN HENDRIK (1823–88). South African politician. Born at Cape Town, Dec. 6, 1823, he was educated at the South African College and at Leyden University. Having become an English barrister, he returned to South Africa to practise, and in 1854 was elected a



Sir Hendrik Brand,
S. African politician

member of the House of Assembly of Cape Colony. In 1863 the burghers of the Orange Free State elected him president; he was several times re-elected and retained that office until his death. He reorganized the state finances, crushed the Basutos, and kept his country out of the war between Great Britain and the Transvaal in 1881. Though his national status was somewhat ambiguous after he became president of the Orange Free State, he was regarded as a British subject, and in 1882 was made a G.C.M.G. He died July 14, 1888.

Brand, JOHN (1744-1806). English antiquary. Born at Washington, Durham, Aug. 19, 1744, he was apprenticed to his uncle, a cordwainer, who assisted him to Oxford. In 1784 he became rector of S. Mary-at-Hill and S. Mary Hubbard in the city of London, and secretary of the Society of Antiquaries, of which he had been elected a fellow in 1777. His *History and Antiquities of Newcastle-upon-Tyne*, 1789, is less important than his *Observations on Popular Antiquities*, 1777, into a revision of which (1813) Sir Henry Ellis incorporated much MS. material left by Brand. The work was re-edited in 1870, and rearranged in 1905, as *Faiths and Folklore*, by W. C. Hazlitt. Brand died in London, Sept. 11, 1806.

Brande, WILLIAM THOMAS (1788-1866). British chemist. Born in London, Feb. 11, 1788, and educated at Westminster School, he was apprenticed to an apothecary. In 1812 he was appointed professor of chemistry and superintending chemical operator to the Apothecaries' Company, and in 1813 succeeded Davy as professor of chemistry at the Royal Institution. In 1854 he was made chief officer of the coinage department at the Mint. Brande specialised in mineral chemistry, and he did much original work on the distillation of coal and the use of coal-gas as an illuminant. He published a *Manual of Chemistry*, 1819; a *Dictionary of Materia Medica and Practical Pharmacy*, 1839; and edited a *Dictionary of Science, Literature, and Art*, 1842. He died Feb. 11, 1866.

Brandenburg. Country of Germany in medieval times. The margraviate and electorate which in 1701 became the kingdom of Prussia, it originated as the district around Brennabor, a settlement of the Slavs, not far from where Berlin now stands.

In the 10th and 11th centuries there was almost constant war between the Christian Saxons of northern Germany and the heathen

Slavs. Brennabor was taken by the Saxons and became Brandenburg and the seat of a bishop; and the district around became a mark or border, ruled by a margrave, whose business was to keep back the Slavs.

In the 11th century the Slavs regained possession of Brandenburg, but by about 1130 it was again in Saxon hands. In 1134 Albert the Bear, who may be regarded as the founder of Brandenburg, was made ruler. He not only fought successfully against the Slavs, but increased his territory by peaceful means. He made a treaty with his former enemy, the Slavonic duke, who, being childless, made Albert his heir.

Rulers of Brandenburg

Albert and his descendants ruled over Brandenburg until 1320. Each prince added to it, until from the outpost of Saxony it became one of the strongest German states. It was no longer the narrow district around Brandenburg, which was called the old mark. It had been extended east to the Oder, this forming the middle mark, while beyond that river was the new mark. Other land had been acquired towards the Baltic. Berlin had been founded and the margrave recognized, in 1356, as an elector of the German king. In the 14th century some of the gains were lost and the country, now a prize for which powerful princes were willing to fight, passed from ruler to ruler. One of these, Sigismund, diminished its size and importance by selling the new mark to the Knights of the Teutonic Order.

The revival of Brandenburg was due to its connexion with the Hohenzollerns. In 1411 Frederick of Hohenzollern came from S. Germany to govern it and in 1415 became its margrave, money and personal services having bought the dignity from the impecunious Sigismund. Under him and his successors Brandenburg was enlarged in all directions. Lands were bought, conquered, or otherwise acquired, and the new mark was recovered. At the same time the Hohenzollerns gathered the reins of government into their own hands.

The Reformation found supporters in Brandenburg, but its rulers cared only for its political aspects. Joachim II, then elector, got for himself lands hitherto the property of the Church, of which he made himself head. More important, perhaps, was his arrangement with his kinsman, the duke of Prussia, in 1569, that if the duke's family died out he should inherit Prussia. This came to pass in 1618, when East Prussia and Brandenburg were united under the same

ruler; they remained, however, quite separate countries, and between them lay West Prussia, then part of Poland.

Growth of Prussia

In the Thirty Years' War the elector reluctantly took part. After a time, however, he withdrew, but at the peace of Westphalia in 1648 he secured Eastern Pomerania and a footing on the Baltic. He had some difficulty in persuading the Swedes to leave this district, but their serious defeat at Fehrbellin in 1675 made them less dangerous. This was in the time of Frederick William, called the great elector. He made his country a factor in the affairs of Europe, and his help was eagerly sought by both France and her foes. So successful was his policy that when he died in 1688 Brandenburg was about the size of England.

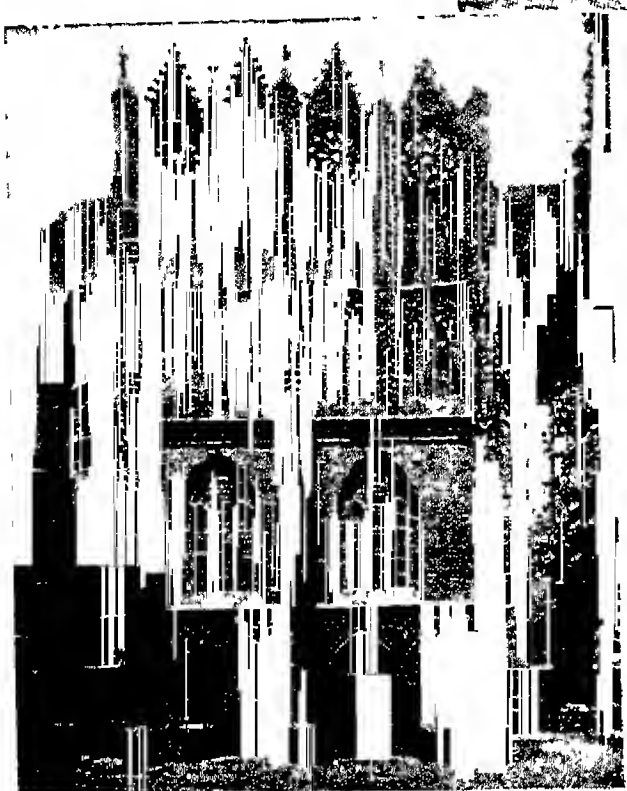
In 1701 the elector received the higher rank of king. He was not king of Brandenburg, but king of Prussia, and henceforward the latter name was used for all his dominions, and history hears little more of Brandenburg. The name still remains in use, however, for the older and central part of the kingdom, forming one of the provinces of Prussia, and the Hohenzollerns always looked upon it with special favour as the core around which all their possessions had sprung. Consult *History of Frederick II*, Carlyle, vol. i, 1858.

Brandenburg. Former Prussian province. It was almost identical with the original fief of the Hohenzollern dynasty, which was an electorate of the Holy Roman Empire from 1411. Its chief river was the Spree. Potsdam was the capital; other important towns were Brandenburg and Frankfort-on-Oder.

Under the Potsdam agreement the part of Brandenburg east of the river Oder was placed under Polish administration, 1945. The *Land* of Brandenburg created in 1946 during the Russian occupation of E. Germany included the former duchy of Mecklenburg-Strelitz; this *Land* was abolished as an administrative division in 1952, the area being divided into administrative regions (among them Neubrandburg, Potsdam, Frankfort-on-Oder, and Cottbus) whose boundaries cut across those of Brandenburg.

Brandenburg. Town of E. Germany, sub-district capital of Potsdam district. It gave its name to the country which developed into Prussia. On the r. Havel, about 36 m. W. of Berlin, it is divided into three parts; the old

town. the new town, and between them, on an island in the river, the cathedral town. Brandenburg was a bishopric from 949 until 1544. The cathedral on the island is Gothic of the 14th century. S. Catherine's, also Gothic, has a finely decorated exterior, and the altar and font are notable. S. Peter's is Gothic of the 14th century, S.



Brandenburg, Germany. Part of the Gothic church of S. Catherine. Above, promenade by the R. Havel

Godehard partly Gothic and partly Romanesque. The town has both an old and a new town hall. The industries include the manufacture of textile paper, beer, bicycles, boots, and leather; also motor cars and, during the Second Great War, arms and aircraft. Pop. (est.) 65,000.

Brandenburg Concertos. Chamber music compositions by J. S. Bach. A set of six concertos was dedicated in 1721 to Duke Christian Ludwig of Brandenburg, and they have taken their place among popular works in the orchestral repertory. Each concerto is scored for a combination of strings, with or without solo piano, strings, woodwind, or brass. The long piano cadenza in the first movement of No. 5 in D; the slow theme of No. 6 in B flat; the fugal finale of No. 4 in G; and the trumpet part in No. 2 in F, are striking music.

Brandes, CARL EDVARD COHEN (1847-1931). Danish author and politician. Brother of Georg Brandes (*v.i.*), he studied classical and oriental languages. Known as a contributor to *Morgenbladet*, he edited the Copenhagen Radical paper *Politiken* 1884-1904. He

was finance minister in Radical Left governments, 1909-10 and 1913-20. His writings include *Danish Dramatic Art*, 1880; *Foreign Dramatic Art*, 1881; and several plays. *Pron. Bran-dez.*

Brandes, GEORG MORRIS COHEN (1842-1927). Danish writer and critic. Born in Copenhagen of Jewish parents, Feb. 4, 1842, he studied jurisprudence, philosophy, and aesthetics at Copenhagen university, 1859-64, after which he spent some years abroad, chiefly in France and Italy. His first three books were *Aesthetic Studies*, 1868; *French Aesthetics*, 1870; and *Criticisms and Portraits*, 1870. In 1872 he returned to Copenhagen, where he taught at the university and wrote the earlier volumes of his *Main Currents of Nineteenth Century Literature*.

In 1877 he settled in Berlin, where he wrote his *Study of Lord Beaconsfield*, 1878, and other books. Having returned to Copenhagen in 1882, he was installed there as a public lecturer by an association of his friends and admirers. His *Study of Shakespeare* (1895-96), Eng. trans. W. Archer, M. Morison, and D. White, 1898, is admirable. Later books include *The Jesus Myth*, 1925; *Hellas*, 1925. Brandes died Feb. 19, 1927.

Branding (A.S. *brand*, burning). Impressing an indelible mark upon the body of human beings or of cattle with a hot iron, as a punishment or as a means of identification. In the case of a human being the marks usually indicated the crime or the status of the subject, e.g. among the Greeks a capital D for *doulos* (slave), among the Romans F for

fur (thief) or *fugitivus* (runaway), and in England V for vagabond, S for runaway slave, M for malefactor, F for fraymaker or brawler.

In France until 1832 galley slaves were branded on the shoulder with a fleur-de-lis, later with TF for *travaux forcés* (forced labour). In the U.S.A. slaves were branded with the owner's initials. In England criminals were branded on the cheek, forehead, breast, shoulder, and hand, and gipsies and vagabonds on the breast. By a Scottish law of 1424 vagrants were branded on the cheek. In the reign of Henry VII branding became the penalty for all who were released by benefit of clergy. Branding was abolished in Great Britain in 1829, except in the case of deserters from the army and soldiers of notoriously bad character, who were tattooed with the letters D and BC as late as 1879. Many victims, including Germans, of the Nazi regime were branded in concentration camps.

Brandling (*Lumbricus foetidus*). Small, striped earthworm used as a bait. See Angling.

Brandon. Parish and market town of Suffolk, England. It is on the Little Ouse, 6 m. N.W. of Thetford. Traces survive of the flint-knapping industry carried on here from prehistoric times. Market day, Thurs. Pop. (1951) 2,815.

Brandon. City and river port of Manitoba, Canada. It stands on the Assiniboine river, at an alt. of 1,234 ft., 134 m. by rly. W. of Winnipeg. An important rly. junction of the C.P.R. and the C.N.R., it has a govt. experimental farm, lumber and sawmills, grain elevators, and various manufactures, and is the centre of a rich agricultural district. Pop. (1951) 20,598.



Branding. Cattle being branded with hot irons at Calgary in Canada

Brandram, ROSINA (1846-1907). British actress and contralto singer. She was born in London. Her



Rosina Brandram,
British actress
Ellis & Watery

first appearance on the stage was at the Opéra Comique, London, in 1877, in *The Sorcerer*. In 1882, after a visit to America, she appeared in *Iolanthe*, and for many years she played leading parts at The Savoy Theatre in the D'Oyly Carte productions. She was the wife of C.C. Butcher. She died Feb. 28, 1907.

Brandt OR **BRANT**, **SEBASTIAN** (1458-1521). German poet and humanist. Born at Strasbourg, he studied at the university of Basel, where he became professor of jurisprudence. His best known work is *Das Narrenschiff* (*The Ship of Fools*), a satire on the vices and follies of the times, 1494. In 1497 Jacob Locher published a Latin version of the satire called *Stultifera Navis*, on which Alexander Barclay based his English verse translation, *The Ship of Fools of the Worlde*. Brandt died May 10, 1521, at Strasbourg, where he was town clerk for 20 years. See illus. p. 1144.

Brandy (Low Ger. *branden*, to distil; *wijn*, wine). Spirituous liquor distilled from wine or the fermented, unmodified juice of fresh grapes. It contains from 40 to 75 p.c. of alcohol by volume and varying quantities of ethers, ethyl acetate, aldehyde, furfural, esters, and non-volatile acids. French brandies are the most favoured, particularly Cognac which is distilled from grapes of specified vines in a delimited area around the town of Cognac in Charente, N.E. of Bordeaux. Second in quality to Cognac are the brandies of Armagnac in the department of Gers.

Most brandy is blended, but vintage brandy of exceptional years is still obtainable. Brandy is matured in oak casks; this softens the spirit and gives it a slight colour, which is sometimes deepened by the addition of caramel. Liqueur brandies are well matured brandies of good quality, smooth and mellow to the palate, and should be drunk neat. The longer brandy matures the lower its alcohol content; once bottled it remains constant.

Brandywine, THE BATTLE OF. Fought Sept. 11, 1777, during the War of American Independence (*q.v.*). The English commander, General Howe, from his headquarters at New York, worked out a

plan for the capture of Philadelphia. With an army of 14,000 men he sailed S., and landed at the head of the Elk river. Washington marched to meet him, and took up a strong position to defend the fords across the river Brandywine, and there Howe attacked him. While feigning a frontal assault, he sent a detachment, under Cornwallis, to cross the stream higher up, with the result that the Americans were soon in retreat. They lost about 1,400 men in all; the English, who could not pursue owing to exhaustion, about 600. A fortnight later Howe took Philadelphia.

Brandywine Creek. River of S.E. Pennsylvania, U.S.A. Rising in Chester co., it flows S.E. to join the Delaware below Wilmington.

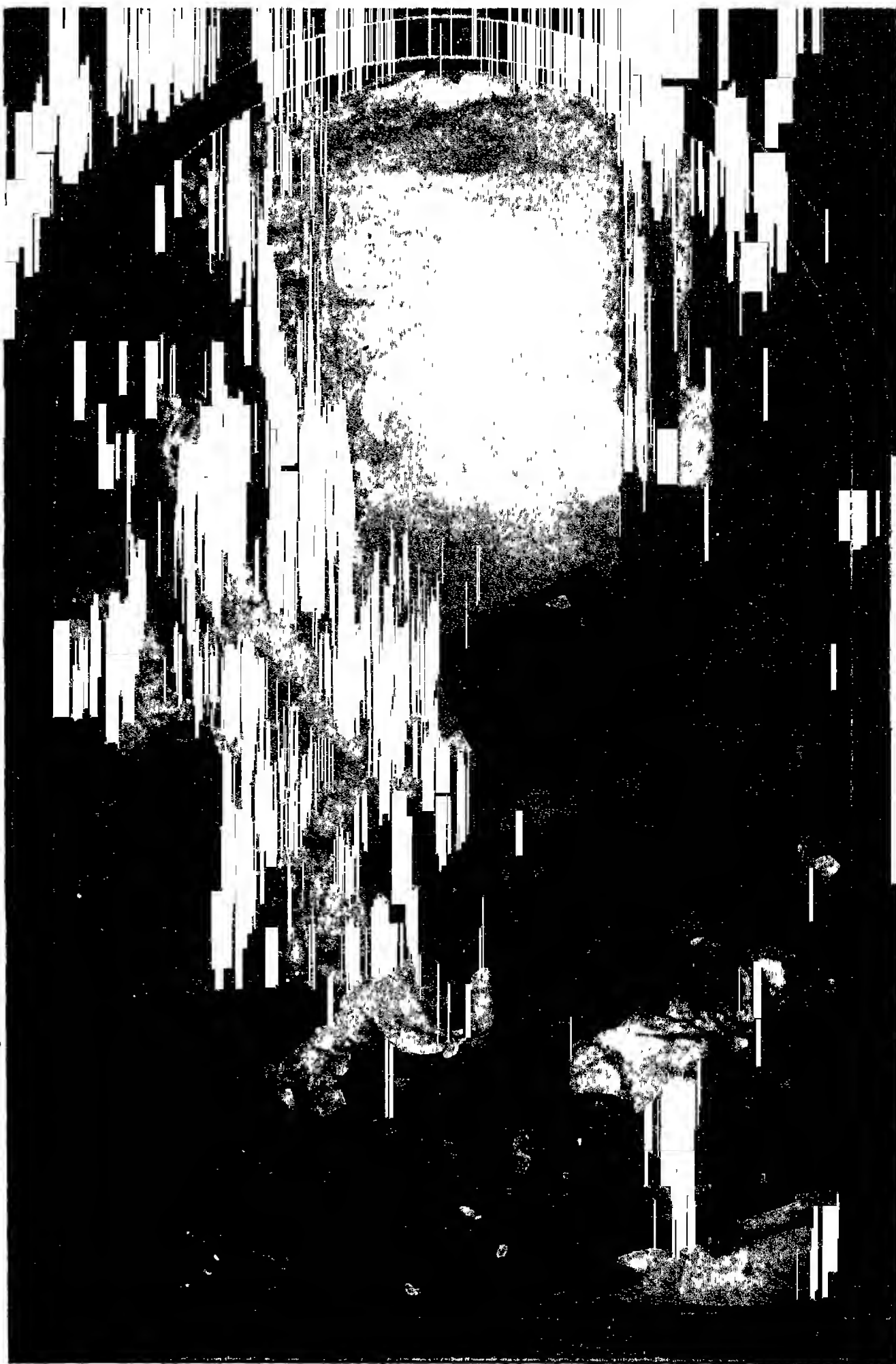
Brangwyn, SIR FRANK (1867-1956). British painter. Guillaume



Sir Frank Brangwyn,
British painter

François Brangwyn was born at Bruges, of Welsh descent, May 12, 1867. He studied at South Kensington, and worked at William Morris's estab-

lishment in Oxford Street, London. The R.A. first hung one of his pictures when he was 17. After travel in the East, he joined the Royal Society of British Artists; and in 1904 was elected A.R.A., in



Frank Brangwyn. Fresco at the Royal Exchange, London, representing Commerce. Characteristic example of the decorative work of this great colourist and draughtsman

1919 R.A. Modern Commerce, the great decorative panel he executed at the Royal Exchange. London, is typical of his gift for colour and his ambitious sense of design; he was also a fine etcher and lithographer.

In 1923 Brangwyn was chosen by the 1st Lord Iveagh to paint a series of panels (for which Iveagh was paying) for the royal gallery in the house of lords as part of the peers' First Great War memorial; the designs, rejected by the lords when completed in 1930, were in 1934 presented by the Iveagh Trust to Swansea's civic centre. Brangwyn designed four panels for the Rockefeller centre, N.Y.C. The Musée Brangwyn at Bruges contains more than 400 works presented by the artist. Brangwyn, knighted in 1941, was the first man to whose work the R.A., 1952, devoted an exhibition during his lifetime. He died at Ditchling, Sussex, June 12, 1956.

Braniewo (Ger. Braunsberg). Town of Olsztyn region, Poland, near the mouth of the Pasleka (Passarge), about 40 m. S.W. of Kaliningrad. Its church dates from the 14th century; its old college, 1558, ranked as a university. The town owes its existence to the Teutonic Order, which had a castle here about 1240. Braniewo belonged to the Hanseatic League, later to Poland, then to Sweden, and afterwards to Poland again. Prussia secured it in 1772. It suffered badly during the Second Great War, after which it passed to Poland again.

Brank. Instrument of punishment once employed for scolds and witches in Staffordshire and other parts of Britain. A form of skeleton helmet, it was locked on the head, and held a piece of metal over the tongue. The tongue-piece held the tongue flat, or was so arranged as to wound it if the wearer spoke.

Brankovich, GEORGE (1367-1457). Serbian ruler. He succeeded his uncle, Stephen the Tall, as ruler of Serbia, with the title of despot, when the country was tributary to Turkey. Attacked by Sultan Murad II in 1437, while seeking alliances with Hungary and Bosnia, he escaped to Hungary and in 1444 returned at the head of the army. Sharing the command with Hunyadi Janos, he defeated the Turks at Kunovitsa, and at the peace regained the lands taken by the sultan. He died Dec. 24, 1457.

Branle (Fr. *branler*, to shake). French round dance in two time. Popular in the 16th century. It is mentioned by Shakespeare and other writers of the period.

Branly, ÉDOUARD (1846-1940). French scientist. Born Oct. 23, 1846, he practised medicine 1896-1916. He was also director of physics at the Sorbonne, where he carried out experiments on the conduction of electricity through gases, and in 1890 devised a coherer which bears his name. This device was a tube of non-conducting material (i.e. glass) having two terminal plugs between which was a loose mass of powdered iron filings, normally offering no conductive path to an electrical current. When an electric spark discharge took place in the neighbourhood of the coherer, the powdered metal acquired conductivity and allowed a current from a battery to pass around a circuit in which the two terminals of the coherer were connected. Thus Branly's coherer constituted a detector of Hertzian waves. Marconi acknowledged the debt he owed to the experimental work of Branly, who died March 31, 1940.

Brant, JOSEPH. The name taken by the Mohawk chief. Thayendanegea (1742-1807). Educated by the English, he became a Christian, fought on the British side against the French, became a missionary, remained loyal during the War of American Independence, and afterwards settled in Ontario, where he again took up missionary work. He died Nov. 24, 1807.

Brantford. City and port of entry of Ontario, Canada. Capital of Brant co., it stands on Grand River, communicating by a short canal with Lake Erie, and is 24 m. W.S.W. of Hamilton by rly. In a rich mixed farming district, it makes agricultural implements, textiles, twine, and machinery for wood pulping and mining. A judicial centre, it has a customs house, general hospital, and sanatorium. At Tutela Heights close by, Bell invented the telephone in 1874. Near by is a large Indian reservation. Pop. (1951) 36,727.

Branting, KARL HJALMAR (1860-1925). Swedish socialist. Born at Stockholm, and educated at the University of Uppsala, he entered the Swedish parliament in 1896, and in 1907 became leader of the Social Democratic party, which under him increased its representation, securing 80 seats at the general election in 1917. He supported the Allies in the First Great War, and was minister of finance 1917-18. In 1920 he became head of the first socialist cabinet in Sweden, and received the Nobel peace prize in 1921. He died Feb. 24, 1925.

Brantôme, PIERRE DE BOURDEILLES, SEIGNEUR DE (c. 1540-1614). French soldier and memoir-



Pierre, Seigneur de Brantôme, French soldier and author
From an engraving

writer, chamberlain to Charles IV and Henry III of France. Born in Périgord, he was educated at Paris and Poitiers. Although made abbé of Brantôme in his 16th year, he never took

orders. In 1561 he accompanied Mary Queen of Scots from France to Holyrood; in 1561 and 1579 he visited Elizabeth I.

In 1564 he was in Morocco, and a year later fought with the Knights of Malta against the sultan. He served in Italy, in Africa under the Spaniards, in Hungary against the Turks, and in his own country against the Huguenots. About 1594 he retired from court; his memoirs record its scandals and gallantries. He died July 15, 1614.

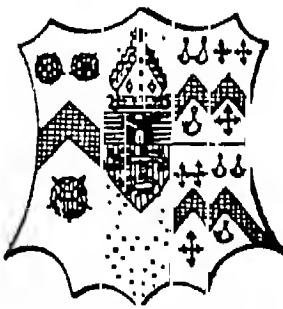
Braque, GEORGES (b. 1882). French artist who, with Picasso, evolved Cubism (*q.v.*). Braque was born May 13, 1882, at Argenteuil-sur-Seine, near Paris, and brought up in Le Havre. He studied painting at the Académie Humbert, Paris, 1902-03, first exhibiting in 1906, at the Salon des Indépendants; Cézanne's painting and ancient Egyptian and Greek sculpture influenced him. In 1907 he met Picasso; and from 1909 was closely associated with him in developing what came to be called "cubism"—painting of semi-abstract patterns based on the fine shapes of common objects.

Braque served, 1914-16, in the First Great War, being severely wounded, 1915, and winning the croix de guerre. He designed the décor for the Diaghilev ballets *Les Fâcheux*, 1924, and *Zéphyre et Flore*, 1925. In his painting he subordinated accuracy of representation to integrity of design; his work has a dramatic quality enhanced by his restrained yet individual use of colour. The Musée Contemporaine, Paris; the Museum of Modern Art, N.Y.; the Tate Gallery, London, possess works by Braque; among representative exhibitions were those in Brussels, 1936, New York, 1948-49, Edinburgh and London, 1956. See illus. in p. 637.

Bras d'Or. Deep, irregular, tideless gulf almost bisecting Cape Breton Island, Canada, some 50 m. long by 20 m. broad. Cod

and mackerel fishing are carried on, and its picturesque shores attract many tourists.

Brasenose College. Oxford college. It was founded in 1509 by gifts from William Smith, bishop of



Brasenose College arms

Lincoln, and Sir Richard Sutton. As early as the 13th century there was a Brasenose Hall, named perhaps after its bronze knocker in the shape of a nose.

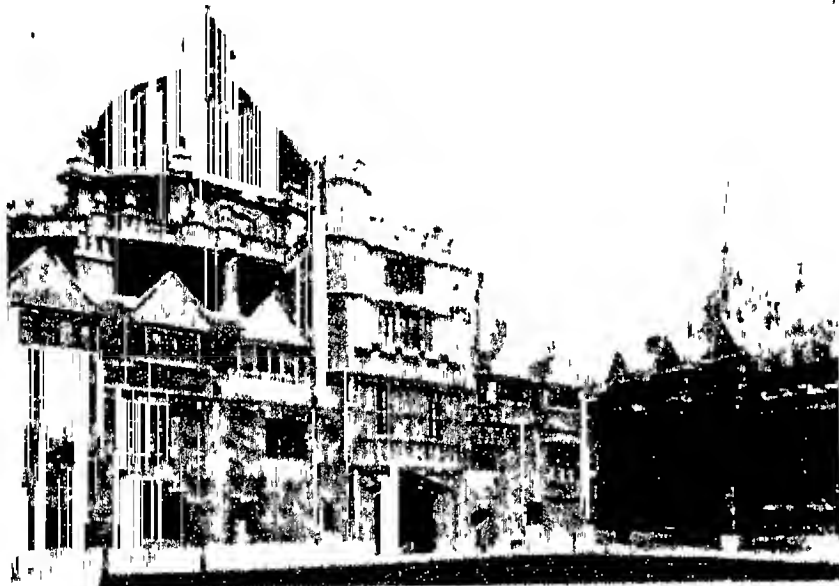
This name was taken by the college, in full, the King's Hall and College of Brasenose. The buildings are between Brasenose Lane and the High Street. There are a number of scholarships and exhibitions, the college being specially connected with Lancashire through the Hulme scholarships. In the 19th century the college had a great reputation for sport. Most of the buildings are old, and a tower, the hall, and the chapel are worthy of mention. New buildings have been erected facing the High Street. Members of the college included Thomas Traherne, John Foxe, Robert Burton, Elias Ashmole, Reginald Heber, R. H. Barham, Walter Pater, the 1st Earl Haig, and the 1st Lord Tweedsmuir. *Pron.* braze-nose.

Brasidas (d. 422 B.C.). Spartan general during the first period of the Peloponnesian War. In 424 B.C. he was sent with a small force on an expedition to Macedonia, where his eloquence and military reputation persuaded several cities, including the wealthy colony of Amphipolis, to go over to Sparta. To recover Amphipolis, the Athenians sent a force under Cleon (q.v.) which was signally defeated by Brasidas, who, however, fell on the field of battle.

Brasov (Mag. Brasso; Ger. Kronstadt). Town of Rumania, in Transylvania. It lies 70 m. E.S.E. of Sibiu (Hermannstadt), and until 1919 was in Hungary. It occupies the most important strategic position in the S.E. of Transylvania, its rly. communications in all directions crossing mountain passes river valleys, or plains.

The inner town, with some original fortifications extant, is commanded by the Schlossberg,

with its fort built 1553 by the Austrians. The early 15th-century town hall, with a tower nearly 200 ft. high, was restored at the end of the 18th century. The oldest church is S. Bartholomew's, though a Protestant Gothic building dates from c. 1400. Here Honterus (1498-1549) once preached; he is known as the Apostle of Transylvania and has a statue in Brasov, and a library founded by him is in the museum. There are technical institutes and high schools. A banking centre, Brasov makes cloth, leather, and cement, and engages in oil refining. It was captured by the Germans in Oct., 1916, during Falkenhayn's counter-offensive against Rumania. It was called Orasul Stalin (Stalintown) 1948-56. Pop. (1948) 83,984.



Brasenose College, Oxford. The main quadrangle of the college. Behind is the dome of the Radcliffe Camera

Brass. River, division, and town in Nigeria. The river, an outlet of the Niger, is about 100 m.

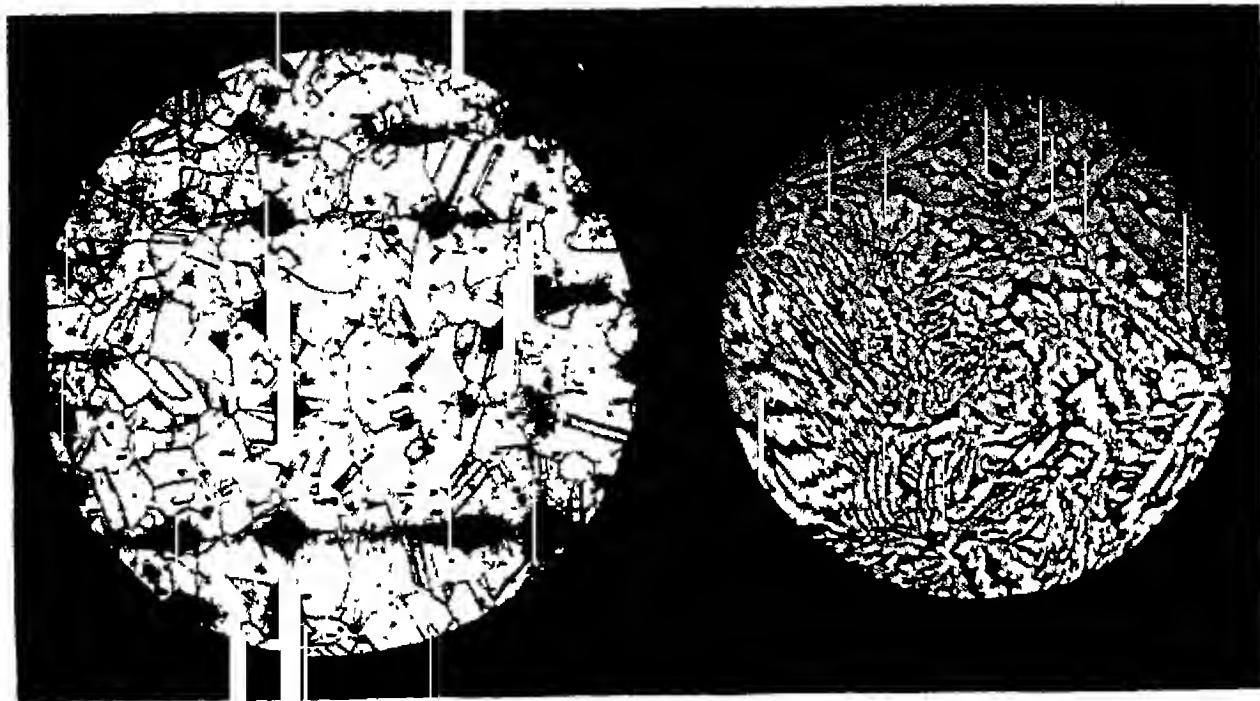
long. The town, a prosperous trading centre, is at the mouth of Brass river. It is the h.q. of Brass division, area 3,350 sq. m.

Brass. Alloy of copper and zinc which may include relatively small quantities of other elements. Indirect references in Aristotle, Theophrastus, and Strabo suggest that brass may have been used by the ancient Greeks. The reference in Genesis to brass as the metal worked by Tubal Cain is due to a translator's error—the metal was probably bronze. The Romans began to use brass coins about 20 B.C., the alloy being made by smelting copper with calamine, an ore of zinc; it was not till many centuries later that zinc metal was isolated.

Copper-zinc brass alloys usually contain other elements (principally aluminium, manganese, lead, nickel, silicon, tin) to develop certain desired properties. The classification of such alloys is based upon their microstructure and is as follows: (a) Alpha brasses, containing less than about 39 p.c. zinc; soft and ductile, can readily be cold-worked. They are fabricated by rolling or drawing. (b) Alpha-plus-beta brasses, containing 37.5-46 p.c. zinc; too hard and brittle to be cold-worked but become very plastic at high temperatures so that they can be hot-rolled, forged, and extruded with ease. (c) Beta brasses, containing 46-50 p.c. zinc; stronger than alpha-plus-beta brasses and hot-working materials. This type of brass forms the basis of high

COMPOSITION AND USES OF TYPICAL BRASSES

Name	Nominal Composition (per cent.)			Uses
	Copper	Zinc	Other Metals	
Cap copper ..	98	2	---	Ammunition priming caps
Gilding metals	95-85	5-15	---	Jewelry, architectural and decorative metalwork; colours range from yellow to red
Aluminium brass	76	22	Aluminium 2	Marine condenser tubes
Cartridge brass	70	30	---	Cartridge and shell cases; tubes; pressed, spun, and drawn articles
Admiralty brass	70	29	Tin 1	Water-cooled condenser tubes
Clock and engraving brass	65	34	Lead 1	Gear wheels, bearing plates, clock and instrument scales
Basis brass ..	65-61.5	35-38.5	---	Cold presswork
Muntz metal ..	60	40	---	Hot working and casting
Naval brass ..	60	40	Tin 1 (incorporated)	Hot worked and cast objects in contact with sea water
Turning brass ..	60	40	Lead 0.5-3.5 (incorporated)	Machined parts made on automatic lathes
High tensile brasses	60-56	34-40	Aluminium, Tin, Manganese, Iron, Nickel, Lead up to 3 p.c.	Nuts, bolts, valve bodies, pump parts, architectural metal-work



Brass. Photomicrographs showing structure of two types. Left, brass containing 70 p.c. copper and 30 p.c. zinc; only "alpha" crystals present. Right, alloy containing 60 p.c. copper and 40 p.c. zinc; the "beta" shows dark in colour. Magnified over 50 times

tensile brasses containing small proportions of other metals. (d) Beta-plus-gamma brasses, containing more than 50 p.c. zinc, hard and brittle, not used commercially. The table in p. 1381 lists the most important commercial brasses.

Brass Band. Combination of instruments of the horn, trumpet, and bugle families of various pitches. The number varies but usually includes one E flat cornet, several B flat cornets, flugel horns, trombones, euphoniums, and bombardons, also drums and cymbals. Amateur brass bands abound in the N. of England. They developed there along with industrialism from the middle of the 19th century, many famous bands having been connected with particular factories or collieries. The skill of the players has reached a very high standard, virtuosity often being handed down as a family tradition from father to sons. Annual band contests, arousing great enthusiasm, have been held at Belle Vue, Manchester, since 1853. At the instigation of Sir A. Sullivan, an enthusiast, J. H. Iles, organized the first annual international competition at the Crystal Palace, London, in 1900. As many as 200 amateur bands have competed there in one year, though on every occasion but one the winners were an English band. The exception was Australian. Contest pieces have been written by many distinguished composers, including Elgar, Vaughan Williams and John Ireland.

Brasses, MONUMENTAL. Engraved tablets of latten (*q.v.*) or brass placed in Christian churches as memorials of the dead. They were introduced in the 13th century to replace effigies in the round. There are 4,000 examples in England, chiefly in East Anglia, Kent,

and Surrey; a few in Wales, two in Ireland, and three in Scotland.

The English practice, although influenced by Flemish models as at King's Lynn, developed into a national art, with guilds in London, Ipswich, Norwich, and Bris-



Brasses. Left: Sir Thomas Bullen (or Boleyn) in Haver church; right: Bishop Goodrich, Ely cathedral

tol. The figures, escutcheons, and inscribed plates were cut separately and countersunk in stone pavements, walls, or altar-tombs. The incisions were often filled with niello, the escutcheons with coarse coloured enamels. Continental brasses were rectangular sheets comprising figures and inscriptions, usually with diaper and foliated ornament. There are a few in Germany, the oldest that of Bishop Yso von Wilpe at Hanover, 1231.

The oldest brasses in England, those at Stoke D'Abernon, 1277, and Trumpington, 1289, portray mailed knights. Under Edward II canopies were introduced. Under

Edward III brasses commemorating other social ranks, ecclesiastical and civilian, with floriated crosses and Norman-French inscriptions, increased in magnificence, as at Cobham, 1354. Lancastrian examples represent children with the parents; Yorkist, profiles and skeletons; Tudor, mural kneeling figures. The art thenceforward showed continuous deterioration to the 18th century, as at St. Mary Cray, until reintroduced by the revived medievalism of the Victorian age. So-called palimpsest brasses are either redated and appropriated to later persons, as at Bromham and Ticehurst, or reversed and re-engraved, as at Chobham and Hedgerly. Rubbings are made on paper with heelball. See Palimpsest; consult Brasses of England, H. W. Macklin, 1907.

Brasseur de Bourbourg, CHARLES ÉTIENNE (1814 - 74). French archaeologist. Born at Bourbourg, a few miles from Dunkirk, Sept. 8, 1814, he became a Roman Catholic priest, and after holding appointments at Quebec and Boston worked as a missionary in Mexico, 1848-63. Here he studied Mexican antiquities and published an elaborate work on the subject. In 1864 he acted as archaeologist for the French in Mexico, and his *Monuments Anciens du Mexique* appeared in 1866. He died at Nice, Jan. 8, 1874.

Brassey, ANNA, BARONESS (1839-87). British traveller and author. Born Oct. 7, 1839, in



Brasses. The oldest English example and some others of historical interest

London, she became the wife of Thomas, 1st Baron Brassey, and helped her husband in his political career. She was a great traveller, and published in 1878 her diaries under the title of *A Voyage in the Sunbeam*, which ran through many English editions, besides appearing in translations. She wrote other books of travel, and, during a voyage taken for her health, died at sea, Sept. 14, 1887.

Brassey, THOMAS (1805-1870). British contractor. Born at Buer-ton, Cheshire, Nov. 7, 1805, the son of a landowner and farmer, he himself was trained as a land surveyor, and in 1829 was in business in Birkenhead. In 1834, through George Stephenson, he obtained the contract for a rly. viaduct, removed to London, and became known as a railway contractor. In England he was constructor for the Great Northern Rly., and other spheres of activity were Canada, Australia, India, and Argentina. He died Dec. 8, 1870, leaving an enormous fortune.

Brassey, THOMAS BRASSEY, 1ST EARL (1836-1918). British politician. The eldest son of Thomas Brassey, the contractor, he was born at Stafford, Feb. 11, 1836. Educated at Rugby and University College, Oxford, he became a barrister, and in 1865 entered Parliament as Liberal M.P. for Devonport. During 1868-86 he represented Hastings and he became a Gladstonian Home Ruler.

Brassey's ministerial career lasted from 1880, when he was made civil lord of the admiralty, to 1885, when he left office as its parliamentary secretary. From youth he had taken special interest in naval matters, and in his yacht *Sunbeam* visited nearly all parts of the world. He also founded *The Naval Annual*, and was the author of *Work and Wages*, 1872; *Foreign Work and English Wages*, 1879; *Sixty Years of Progress*, 1906.

Knighted in 1880, he was made a baron in 1886, and went out to Victoria as governor, 1895-1900. In 1911 he was made an earl. In June, 1914, when at Kiel, he was arrested in error by the German authorities. He died Feb. 23, 1918. On the death of his only son, Thomas Allnutt Brassey (1863-1919), the title became extinct.

Brassica. A genus of annual and perennial herbs of the family Cruciferae. They furnish some of



Brassica campestris,
or rape

the most valuable food-crops. The typical species, *B. oleracea*, is the wild cabbage, a native of the W. and S. coasts of Europe, from which have been evolved by selection, crossing, and cultivation some of the most esteemed culinary vegetables, including the cabbage (white and red), Scotch kale, cow-cabbage, borecole, brussels sprouts, savoys, cole-rape, cauliflower, and broccoli. Another species, *Brassica campestris*, the rape, whose seed yields colza-oil, has similarly given us the common turnip and the yellow-fleshed Swedish turnip.

Brassie OR BRASSY. Brass-soled wooden golf club. It should be identical in lie and about the same length as the driver. The face has a slight loft and the club is used through the green when the lie of the ball is not too difficult. The brass sole enables the club to cut through the turf, and the loft gives the ball a necessary rise. The club is only used for shots of considerable length. See Golf.

Brathwaite, RICHARD (1588-1673). English poet. He was born in Westmorland, son of the recorder of Kendal, studied at Oriel College, Oxford, read law at Cambridge, and lived in London for a time before returning to Westmorland. He wrote *A Strap-pado for the Devil*, 1615; and two treatises on manners, *The English Gentleman*, 1630, and *The English Gentlewoman*, 1631. He is best known as the author of *Barnabee's Journal*, in rhymed Latin and doggerel English verse, which, published in 1638 as the work of Corymbaeus, was not ascribed to Brathwaite until 1818. It ran into eleven editions, the last being published in 1876. He died May 4, 1673.

Bratianu OR BRATIANO. Name of a Rumanian family of Liberal statesmen. Ion Bratianu (1821-91) was born at Pitesti, Wallachia, June 2, 1821, took part in the Rumanian rebellion of 1848, and became Liberal leader under Prince Charles of Hohenzollern, later king. Prime minister 1876-88, he made alliance with Russia against the Turks. He died May 16, 1891.

His son, also Ion (1864-1927), was born at Florica, Wallachia, Aug. 20, 1864, and educated at Paris university. Succeeding to the party leadership on his father's death, he was premier from 1909 with brief intervals until his death, Nov. 24, 1927. He brought Rumania to the Allied side in the First Great War, opposed the treaty of Bukarest and the division of the banat of Timisoara between his country and Yugoslavia, and introduced universal suffrage and agrarian reform. His brother Vintila (1867-1930) was a minister in all the cabinets of Ion, succeeded him as premier 1927-28, and opposed the trend towards dictatorship in Rumania. Vintila's son Constantin was director of the prime minister's office 1914-18; secretary to the delegation to the peace conference of 1919; leader of the National Liberal party during the Second Great War; and was minister of war production for a few months from Aug., 1944.

Bratislava. (Mag. Pozsony; Ger. Pressburg.) City of Czechoslovakia, capital of a region of the same name. In Hungary until 1919, it occupies a strategically important situation at the S. base of the Little Carpathians where the Danube flows between them and the heights of Burgenland through the Bratislava Gap (Gate of Pressburg). Bratislava is 35 m. E.S.E. of Vienna, close to both the Austrian and the Hungarian borders.

From 1526 Hungarian kings were crowned in the Gothic cathedral of S. Martin; the Hungarian parliament met in the Landhaus until 1848. The old town hall houses the municipal museum, and close by is the Franciscan church, founded 1272. The new town hall is the 18th-century archbishop's palace where Napoleon I and the emperor Francis II signed the treaty of Pressburg in 1805, and where the Hungarian revolutionaries had their h.q. 1848-49. The ruins of the royal palace, burned down in 1811, crown a wall-encircled plateau 270 ft. above the river, entered through a Gothic gateway.

The modern city is an industrial and communications centre. It has a large oil refinery, food processing and tobacco factories, ship-building yards, and a range of manufactures. There are two airports, extensive harbour installations, and a broadcasting station. There is a Slovak university established in 1919. Pop. (1947) town, 172,664; (1948) region, 838,134.

Brattice (German *brett*, board). Partition used for controlling the direction of flow of gases. Brattices are used in the ventilation systems of mines where they may be walls built of rough stone, rendered airtight by plastering with clay, or walls built of boards or timber frames covered with tarred canvas (brattice cloth). A brattice may divide a shaft into two parts, one for the descent of fresh air, the other for the ascent of foul air.

Brauchitsch, WALTER HEINRICH HERMANN ALFRED VON (1881–1948). German general, Hitler's commander-in-chief in the early stages of the Second Great War. Born on Oct. 4, 1881, he became a professional soldier, and had been a divisional commander under the republic when chosen by Hitler in Feb., 1938, to succeed Fritsch as commander-in-chief. Brauchitsch was expected to prove more malleable than his predecessor, but resigned with several other leaders in Dec., 1941, after a vain protest against Hitler's order to carry on the assault against Moscow and Leningrad. In Aug., 1945, he was arrested by the British in the British zone of occupation in Germany; he died Oct. 19, 1948, before any charge had been brought against him.

Braun, EVA (d. 1945). Alleged wife of Adolf Hitler. Formerly a photographer's assistant, she is said to have been associated with Hitler for 15 years. The marriage was reported to have taken place in the besieged Berlin chancellery shortly before their death there, April 30, 1945.

Braun, KARL FERDINAND (1850–1918). German physicist and radio pioneer. Born at Fulda June 6, 1850, and educated at Marburg and Berlin, he became professor of physics at Marburg in 1877; professor of physics and director of the physical institute at Strasbourg, 1895. He made researches into the electrical phenomena of cathode rays, and effected considerable improvements in radio-telegraphy. He shared with Marconi the Nobel prize for physics in 1909. He died April 20, 1918.

Brauna Wood. Timber of a large tree (*Melanoxylon brauna*) of the family Leguminosae, a native of Brazil. It is very hard and durable. From it are made the crushing rollers used in sugar mills. The wood and bark both afford a red-brown colouring matter with which the Brazilians dye cotton.

Braunsberg. See Braniewo.

Brava. Southernmost of the Cape Verde Islands, Portugal. It

is hilly, fertile, and healthful. Its chief industry is the making of palm-leaf hats. The port of Brava, or São João Baptista, is visited by whaling ships.

Brawling. In English law, making a disturbance in a church or on consecrated ground. Before the Reformation the offence was dealt with by the ecclesiastical courts. After the Reformation, by a statute of Edward VI temporal punishment could be inflicted by the ordinary courts where the offence was more than mere words. By the Brawling Act, 1860, it is an offence punishable by fine up to £5 or imprisonment up to two months to be guilty of riotous, violent, or indecent conduct in a registered place of worship, church, or churchyard, or to interfere with preacher or minister who is administering any rite or lawfully preaching therein.

Braxfield, ROBERT MACQUEEN. LORD (1722–99). Scottish judge, the original of Lord Weir in R. L. Stevenson's *Weir of Hermiston*, 1896. Educated at Edinburgh University, he became an advocate in 1744, a lord of



Lord Braxfield,
Scottish judge

justiciary in 1780 and lord justice clerk in 1788. He was notorious for his harsh treatment of political prisoners.

Braxy. Disease of sheep due to infection by *clostridium septique*. It is most prevalent in the U.K. from late Sept. to early Feb. amongst young sheep on hill grazings or after severe frost amongst sheep moved from hill to lowland pasture. Symptoms are colic pains and the passing of blood-stained urine, but victims are sometimes found dead of the disease without having shown any symptoms. The body of a sheep dead of braxy usually bursts. Incidence of the disease can be checked by inoculation of sheep early in their first winter.

Bray. Parish and village of Berkshire, England. It is on the Thames, 1½ m. S.E. of Maidenhead. Pop. (1951) 4,272.

The vicar of the famous song, determined that "Whatsoever king may reign, I'll be the Vicar of Bray, sir," is said to have been named Simon Aleyn, and to have enjoyed the benefice not, as the song has it, from the reign of Charles II to that of George I. but in the more dan-



Bray, Berkshire. Corner of the village, showing the church

gerous period from the Reformation to the reign of Elizabeth I. His anxiety to conform is reputed to date from 1543, when he stood in the crowd at Windsor to watch the burning at the stake of the martyrs Pearson, Testwood, and Filmer.

Bray. Urban district, market town, seaport, and resort of the Irish Republic, on the border of co. Wicklow and co. Dublin. It lies on the Irish Sea 12 m. S.E. of Dublin under the shelter of Bray Head, and has a harbour, an esplanade, and good bathing. Market day, Sat. Pop. (1951) 12,062.

Bray, SIR REGINALD (d. 1503). English politician and designer, architect of Henry VIII's chapel, Westminster Abbey. Born near Worcester, he became receiver general and steward in the household of Sir Henry Stafford, stepfather of Henry VII. He subsequently became high treasurer and chancellor of the duchy of Lancaster, and was a member of the parliament summoned in 1496. He decorated and finished S. George's chapel, Windsor, building at his own expense the chapel in the south aisle called by his name. He died Aug. 5, 1503.

Braybrooke, BARON. English title dating from 1788, when Field-Marshal Sir John Griffin-Whitwell was created Baron Braybrooke. He was already Lord Howard de Walden and the heir general of Baron Griffin of Braybrooke. When he died without sons in 1797, his baronies were separated. Richard Aldworth-Neville became Lord



3rd Baron Braybrooke

Braybrooke, and the title passed to his descendants. Richard, the 3rd lord (1783–1858), is known as the editor of Pepys; Latimer,

the 6th lord (1827-1904), was a clergyman and master of Magdalene College, Cambridge. Audley End (*q.v.*), Saffron Walden, formerly the family seat, became national property in 1948.

Brazen Head. Medieval magical appliance made of brass in the likeness of a human head. The best known story is that of the brazen head reputed to have been made by Roger Bacon and Thomas Bungay with a view to finding out how to make England impregnable. The two philosophers, growing tired of waiting for the head to speak, left an assistant on guard while they slept. During their slumbers the head uttered at intervals the words, "Time is," "Time was," and "Time is past,"

and then fell to the ground and broke in pieces. The possession of a brazen head was frequently attributed to men of learning in the Middle Ages.

Brazen Serpent. Replica of one of the fiery serpents which afflicted the Israelites in the Wilderness. The serpents were sent as a punishment of rebellion, and the image of one, wrought in bronze or copper, was set up on a pole by Moses, at the command of Jehovah, for the afflicted to look up to in token of repentance, whereupon they lived (Num. 21; Wisdom 16, v. 5; John 3, v. 14). The brazen serpent was preserved until it became an object of worship, and was destroyed by Hezekiah (2 Kings 18, v. 4).

BRAZIL: A REPUBLIC OF SOUTH AMERICA

This detailed account of the world's fourth largest country deals particularly with its immense natural resources and their development into prosperous industries. See also articles on the various rivers (e.g. Amazon) and cities (e.g. Rio de Janeiro)

The United States of Brazil is a republic of South America occupying almost half of that continent and one-seventh of the land surface of the world, of which it is the fourth largest country; area 3,288,000 sq. m. Its maximum length and width are both about 2,700 m., and it has frontiers with all other countries of South America except Chile and Ecuador. It has five zones: (i) the Amazon basin in the N. and W.; (ii) the La Plata basin in the S.; (iii) the Brazilian highlands, lying between these two basins; (iv) the Guiana highlands N. of the Amazon; and (v) the narrow coastal strip on the Atlantic.

The Amazon river and its tributaries drains some 2,700,000 sq. m. of lush tropical forest, sparsely populated and much of it unexplored. The humid heat has created a jungle, subject to inundations, teeming with voracious ants, fierce saw-toothed fish, alligators, snakes (in immense variety), and other wild animals, of which the tapir, jagua, and giant anteater are the largest. Above the flood plain, where the foliage is thickly matted, hardwood forests admit sun and fresh air, and the land can be cleared and worked.

The La Plata basin, which includes the prosperous states of São Paulo, Minas Geraes, and Rio Grande do Sul, consists of healthy tablelands, with rich soil and well distributed rainfall. It is thickly forested in the N. and covered in the S. by wide grass lands.

The Brazilian highlands form a tableland 1,000-3,000 ft. high with an area of drought to the N.E. and of swamp to the W. The great possibilities of the central plateau are unexploited, since its precipitous fall to the coast and the mountain barrier of the great escarpment to the S.E. have impeded communications. The rivers which flow to the Atlantic are unnavigable on account of rapids, and only in two places, between Santos and São Paulo, and between Paranaguá and Curitiba, does a comparatively gradual slope afford easy approach. The valley of the São Francisco is more accessible.

The Guiana highlands are forested on the rainy N.W. slopes and stony desert on the arid S. slopes. On the narrow coastal strip to the E. and S.E. lie Brazil's chief cities, including the federal capital Rio de Janeiro.

Variation in temperature is small; the average is 81°F. in the equatorial regions to 60°F. in the S., but the high rate of humidity (except in the N.E. drought area where rainfall is only 18 ins.) increases the debilitating effect of the heat. Rainfall is 120 ins. in the extreme N., and 78 to 116 ins. in the W., Amazon valley; the average for the whole country is 60 to 78 ins. Most of it falls during the summer months (Dec., Jan., Feb.). The temperate south is subject to greater variations of heat and cold than any other part of the country.

PRODUCTS. The fluctuations of Brazilian economy have been due to a steep rise and fall in the demand for particular crops. During the 16th century the dye of the red-wood tree (*pan Brasil*, from which the name of the country derives) was its chief wealth. In the 17th century the Portuguese settlers of the N.E. cultivated sugar with imported Negro slave labour, and the states of Bahia, Pernambuco, and Parahyba supplied most of the world demand. The industry declined with the expansion of W. Indian sugar production, the expulsion of the Dutch, whose skill in the industry had been important, and the counter attraction in the 18th century of the gold and diamonds in Minas Geraes, Matto Grosso, and Goyáz. The gold and diamond boom was followed by a boom in cotton, which declined in the 1880s after the abolition of slavery.

Then came the growing exploitation of rubber in the Amazon valley, of which Brazil enjoyed a monopoly until cultivated rubber from E. Indian plantations reduced Brazil's share of the world market in rubber from 88 p.c. in 1918 to 8 p.c. in 1922. During the Second Great War, which cut off E. Indian supplies, Brazilian rubber again became significant, and in 1950 was still the most valuable forest product, despite the rivalry of synthetic rubber.

Importance of Coffee

From about 1855, in the S.E., particularly in the states of Rio de Janeiro and São Paulo, coffee became the principal factor of Brazilian economy; Brazil supplied 70 p.c. of world demand in 1913 and, though with growing competition from other countries, coffee remained the chief agricultural crop, accounting for more than half the world's supply and about three-quarters of the value of Brazil's exports. The state of São Paulo produces half Brazil's coffee; Minas Geraes and Paraná produce important quantities. When world demand for coffee fell in the 1930s surplus coffee berries were burnt as locomotive fuel; later they were used to make plastics. In the southern states, where there is no speculative boom crop, a settled intensive and expanding agriculture has been established by generations of German, Italian, and Slav immigrants.

After coffee, the main crops are maize, the chief fodder; and rice,

Brazil's exports and is Brazil's chief supplier. Germany, both for exports and imports, had recovered its pre-war importance by 1955; and trade with other Latin-American countries tends to increase. The monetary unit of Brazil is the cruzeiro and the Bank of Brazil serves as the fiscal agent of the government.

HYDRO-ELECTRIC POWER. Brazil's estimated hydro-electric potential is 18,000,000 kW. The total installed generating capacity in 1954 was 2,733,800 kW. Two large power plants utilising natural falls of water are the Fontes plant at Ribeiro das Lagos, Rio de Janeiro, and the Iturparanga plant on the Sorocaba r., São Paulo. An enterprise of still greater magnitude is that of Serra de Cubato, which utilises the great dams of Lake Guarapiranga and the Rio Grande reservoir, each backing up about 30 m. of streams; with a potential of 1,000,000 kW. it provides the motive power for the great industries of São Paulo city. A huge power station at the Paulo Afonso Falls on the São Francisco r. supplies irrigation, electrification, transport, and industrial power to a large, almost barren area of the N.W.

COMMUNICATIONS. In 1955 Brazil had some 23,000 m. of rly., of five different gauges, principally in Minas Geraes, São Paulo, and Rio Grande do Sul. Some 500 m. were electrified; some used Diesel traction, but the majority of locomotives still burnt wood transported from distant forests by lorry. There is rly. connexion between Rio de Janeiro and the capitals of Bolivia, Uruguay, and Paraguay. A line 125-m. long was constructed in the north-east to carry manganese from the Amapá mines to Macapá; and the 350-m. line connecting Itabira ironfield to the port of Vitória was reconstructed to carry 1,500,000 tons of iron ore a year.

In the S.E. and S. all the principal cities are connected by good roads; the 35-m. long express Via Anchieta joins Santos to São Paulo. Another network in the N.E. links Pernambuco, Para-

hyba, Rio Grande do Norte, and Ceará; a highway joins the cities of Rio de Janeiro and Salvador. The Via Presidente Dutra, opened 1951, runs between São Paulo and Rio de Janeiro. There are plans for the construction of trunk routes and connecting roads to link the coastal cities with the interior, and efforts directed to the encouragement of immigration to Matto Grosso and N.W. Goyáz have included the opening, 1943-46, of a track from São Paulo across the central plateau to the Amazon r.; along this route settlements, with air landings, industries, schools, etc., have grown up.

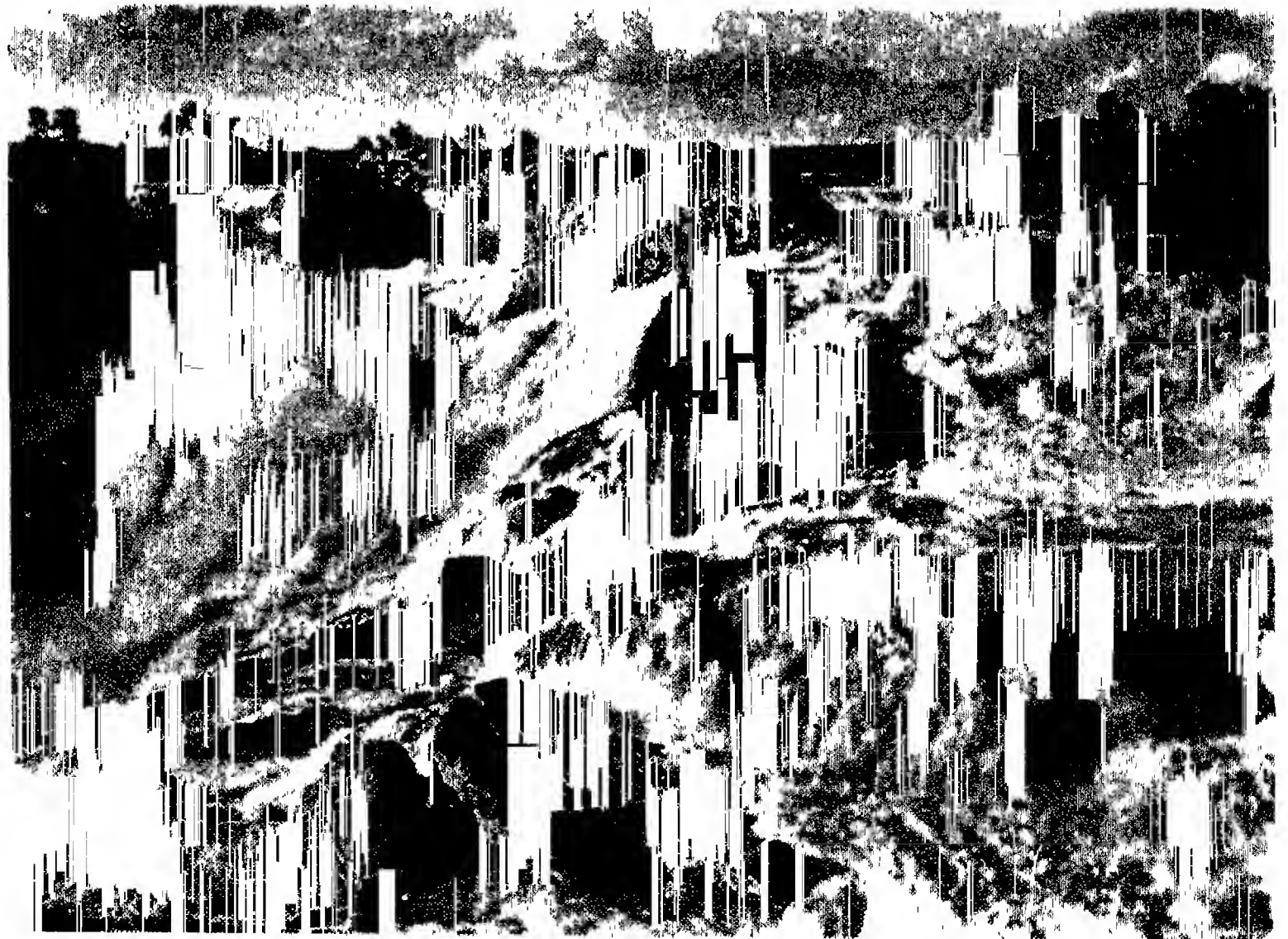
Air Transport Facilities

Brazil has more than 1,000 airports and landing fields, and the number increases yearly, thus opening up isolated sections of the country. Services connect the remotest towns with the federal and state capitals, and the coastal cities are linked by frequent flights. São Paulo main airport clears about a million passengers a year. Panair do Brasil connects with Europe, the U.S.A., and the other Latin-American republics. During 1952-57 some £384 millions was allocated to the re-equipment of ports, expansion of hydro-electricity, improvements in agriculture, and the maintenance of roads, railways, and estuaries.

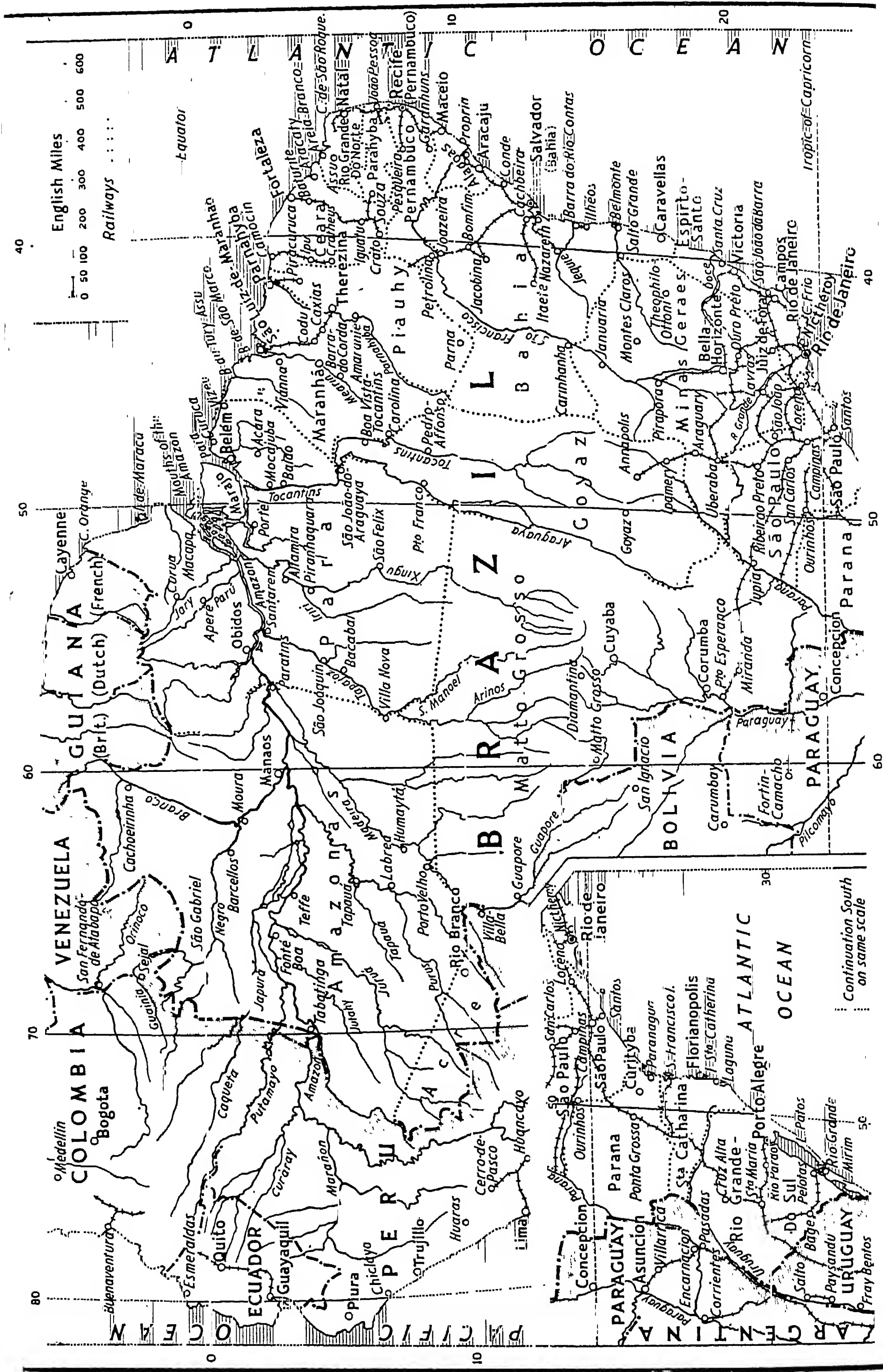
With a coast-line of more than 5,600 m. plus 26,713 m. of navigable waterways, Brazil leads S.

America in commercial shipping. There are 138 natural ports, of which 47 are sea and 91 combined sea and river ports; many have in addition air facilities. The Amazon is navigable for sea-going vessels for 1,000 m.; 270 m. of the Brazilian section of the Paraguay r. is open to international shipping; 280 m. of the Paraná and 200 m. of the Uruguay are also navigable. River craft are generally flat-bottomed paddle steamers of shallow draft; coastal and river traffic is handled by Brazilian boats, foreign trade by both Brazilian and foreign steamship lines, from the principal ports, Salvador, Rio de Janeiro, and Santos.

CONSTITUTION. Brazil is divided into 20 states, five territories, and one federal district. Under the constitution of 1946, legislative power is vested in the national congress: a federal senate, composed of three representatives from the federal district and from each state, elected for eight years; and a chamber of deputies, in which the states and territories are proportionally represented by members elected for four years. Executive power is vested in the president, who must be Brazilian born and over 34 years of age. He is elected for five years and may not succeed himself. Voting is secret and compulsory for men and employed women aged 18-65; optional for women not employed, for persons over 65, and for officers



Brazil. Paulo Afonso Falls, on the São Francisco river in Bahia state, source of inspiration to the country's poets and of power for a hydro-electric installation to serve north-eastern Brazil



UNITED STATES OF BRAZIL: THE LARGEST COUNTRY IN SOUTH AMERICA

of the armed forces; the rank and file of the armed forces and illiterates (some 55 p.c. of the adult population) have no vote. The state may monopolise any form of economic or industrial activity. The constitution of 1946 gave more freedom than before to foreign capital, provided for profit-sharing and paid annual holidays for workers, and for greater autonomy in local administration, which is handled in each state by a popularly elected state assembly under its own president.

The supreme federal court, sitting at Rio de Janeiro, is composed of 11 judges nominated by the president of the republic, and approved by the senate; and as many judges of the lower courts as congress may appoint. There are divisional state courts, supervised by a federal judge and municipal magistrates. There is no state religion, but Roman Catholicism predominates; religious instruction is permitted in the schools, but not required; there is freedom of speech, press, and assembly. There is no divorce and no capital punishment, except for armed rebellion or conspiracy. The language of Brazil is Portuguese; but German and Italian are much spoken in the south, various Indian tongues in the remote Amazon.

EDUCATION. The ministry of education was created in 1930. There are over 80,000 primary schools, with a registration of more than 5,500,000 pupils between the ages of 7 and 11 (about 80 p.c. of the total number). Of the 2,500 secondary schools, with an enrolment of about 540,000, about 80 p.c. are privately owned. An increasing proportion of the budget is devoted to education, and there are many industrial, commercial, and art schools, as well as important centres for adult education. Industrial, commercial, and agricultural concerns employing more than 100 people are obliged to provide free primary education for employees and their children. In 1920 the University of Brazil was founded in Rio de Janeiro; there are 10 other universities and several independent institutes for advanced learning.

The national library in Rio de Janeiro, opened in 1810, contains

more than 1,000,000 books, 600,000 mss., 250,000 maps, prints, and illustrations, and about 300,000 volumes of newspapers and magazines. There are 762 municipal and public libraries throughout the country, and there is a vigorous and independent press. The most important newspaper group in Rio de Janeiro is *Diários Associados*, controlled by Senhor Assis Chateaubriand; a smaller but influential São Paulo

Japanese, Polish, and Russian strains, with descendants of the early Negro slaves strongly in evidence. About 61 p.c. are white, 25 p.c. mixed white and Negro, 11 p.c. Negro; the remainder are aboriginal Indians and people brown-skinned in various degree. There is no colour bar and miscegenation has had strikingly successful results.

The four largest cities (Rio de Janeiro, São Paulo, Recife, and

Salvador) at the 1950 census had 10 p.c. of the whole population, which is increasing at the rate of a million a year. More than 5,000,000 immigrants entered the country during 1850-1950, most of them in the 20th century. Of these about 35 p.c. were Italians, who make very satisfactory and easily assimilated colonists, 30 p.c. Portuguese, 12 p.c. Spaniards, and 3 p.c. Germans. About 200,000 Japanese arrived during 1908-45, and it is estimated that 400,000 people in Brazil are of Japanese origin. The Latin strain still predominates in a people who are courteous, unprejudiced, hospitable, religiously sensitive, and peaceable. It is significant that the three Brazilian revolutions, which inaugurated independence, the republic, and the Vargas dic-

tatorship, were all bloodless.

HISTORY. The country was discovered in 1500 by Pedro Alvarez Cabral. Pope Alexander VI's famous "line of demarcation" division of all New World territories between Spain and Portugal gave Brazil to Portugal. Colonisation, which began a few years later, centred on the city of Salvador (or Bahia) where rich Portuguese landowners, often absentees, ran huge estates on slave labour imported from Africa, since the Indians made unsatisfactory workers. Less wealthy, but more adventurous, settlers in the S. explored the interior, particularly during the gold and diamond cycle, and formed isolated colonies as far away as Amazonia. During the Napoleonic invasion of the Iberian peninsula, the prince regent of Portugal (King John VI from 1816) embarked in Nov., 1807, with his whole court (some 15,000 people) and sailed to Rio de Janeiro, and Brazil acquired its first central



Brazil. A church at Ouro Preto, Minas Geraes state, in the attractive colonial architecture of the country

combine is modelled on the popular British press. The principal papers have Sunday editions and a total circulation of 2,000,000. The morning paper with the largest circulation is *Diário de Notícias*, which is independent in politics and independently owned. There are some 400 broadcasting stations; television was introduced in 1950.

PEOPLE. Brazil is sparsely populated, and only 5 p.c. of the cultivable land is used. The population at the census of 1950 was 51,944,397, nearly three-quarters of whom were concentrated in the S.E., chiefly in São Paulo, Minas Geraes, and Rio Grande do Sul. The vast hinterland of Amazonas, Matto Grosso, and Pará is among the most sparsely populated areas of the world; the herdsmen and the foresters who live there are of Portuguese and Indian stock. Elsewhere, the base is Portuguese to which have been added Belgian, Dutch, French, German, Italian,

government. Uniquely in S. America, it retained monarchical rule during the formative years of independence. In 1820 King John resumed the Portuguese throne and left as regent his son Pedro, who was elected two years later as the first constitutional emperor of independent Brazil.

Reign of Pedro I

For many years the court of Pedro I outshone in magnificence the court at Lisbon, but as a result of a secession movement in the N. and the loss of Uruguay (which had been part of Brazil), he had, in 1831, to abdicate in favour of his five-year-old son, who assumed the throne as Pedro II after an uneasy regency of 10 years. Pedro II was moderate, progressive, and highly intelligent, with a strong leaning to republican sentiments. He did so much to reduce the strength of feudalism that he became unpopular with the landed classes who, when the abolition of slavery in 1888 ruined many of them, joined the republicans to overthrow the monarchy. On Nov. 15, 1889, a federal republic was declared; it became effective after five years of military dictatorship. The constitution, modelled on that of the U.S.A., was modified in 1934, suspended 1937-46, then re-established with some amendments. In 1917 Brazil declared war on Germany, a Brazilian squadron acting in European waters with the British fleet. Shortages during the First Great War led to the beginning of industrialisation in Brazil. In 1942 Brazil declared war on Germany, and played an important part in Allied strategy by fighting U-boats in the S. Atlantic; an expeditionary force fought with distinction in Italy. In 1945 Brazil declared war on Japan.

In 1930 Getúlio Dornelles Vargas, governor of Rio Grande do Sul, headed a successful revolution, and was elected first president under the new constitution of 1934. In 1937 he organized a *coup d'état*, dissolved all political parties, and ruled as a more or less benevolent dictator until he resigned in 1945 under pressure from the army. During his regime there was improvement in education, medical and social services, the civil service, and general government procedure; reclamation projects were forwarded, highways and railways improved, and agricultural experimental stations set up. Radio and press

were controlled; political offenders imprisoned without adequate trial; inflation mounted. The following administration under President Dutra made possible a return to party politics and constitutional government; but Vargas was re-elected in a fairly conducted poll in 1950, and resumed the presidency in Jan., 1951. He committed suicide in 1954 as a result of the dollar and coffee crisis, and the coalition of the army, Church, and industrialists against him.

CULTURE. Apart from folk music, the Portuguese found no indigenous culture in Brazil, and until the 19th century art and literature were weak imitations of successive European schools. The first creative artist was the crippled mulatto sculptor, Antonio Francisco Lisboa (1730-1814), known as Aleijadinho (little cripple), whose carvings in wood and coloured soapstone adorn the colonial churches of Minas Geraes. Other sculptors of note were Victor Brecheret and Celso Antonio, and, showing marked French influence, Bruno Giorgi, Adriana Janacópoulos, and Figueira. The paintings of Caudido Portinari became known in the U.S.A. and in Europe; he was the leading figure in a movement which originated in São Paulo in 1922 with the Lithuanian painter Iasár Segall; his vigorous frescos portray the regional occupations of South America.

Brazilian Musicians

The first Brazilian musician of any importance was Father José Maurício Nunes Garcia (1767-1830) whose works are in the Haydn-Mozart tradition; a pupil of his founded the conservatory of music in 1841. The Italianate operas of Carlos Gomes (1836-96) achieved recognition in Europe, but the greatest creative musician of the western hemisphere is Heitor Villa-Lobos (b. 1884) whose original orchestration and development of folk themes found wide recognition. Another outstanding composer is Lorenzo Fernandez; Rademés Gnattali has been called the Gershwin of Brazil, Carmen Miranda popularised the songs of her country in Europe and the U.S.A.; Bidú Sayao gained fame as a soprano opera singer, Francisco Mignone as a conductor.

Brazil has made a significant contribution to world architecture. Influenced by Corbusier, Lúcio Costa and Oscar Niemeyer developed the use of integrated ex-

ternal louvres to control the effect of heat and glare on glass surfaces; and the painter Portinari cooperated with Niemeyer in using the colonial tile motif with new architectural forms. Town planning, as exemplified in Belo Horizonte and Goiania, is of a high order.

In the second half of the 19th century there was rapid development in genuine Brazilian literature, influenced by French romanticism. The poet Antônio Gonçalves Dias (1823-64) combines in his *Poesias Americanas* the Indian, Negro, and Portuguese spirit which are the ethnic realities of Brazil. Castro Aloes (1847-71) wrote impassioned verse against slavery; Jorge de Lima, Murilo Mendes, Carlos Drummond de Andrade, and Manuel Bandeira are later influential writers. Outstanding novels have been Chanaan, Graca Aranha (1886-1931); Dom Casmurro, Machado de Assis (1839-1908); and *Os Sertões*, Euclides da Cunha (1886-1909). Gilberto Freyre wrote much on social problems. Benjamin Constant, the first minister of education of the republic, introduced the positivism of Auguste Comte, which proved formative in Brazilian thought. Santos-Dumont (1873-1932) was a pioneer of aviation, constructing and flying many lighter-than-aircraft. Oswaldo Cruz did important work in combatting malaria and yellow fever.

After the First Great War there was an accelerating change in the orientation of Brazil away from Great Britain, which had held a leading position in the country's finance and commerce, towards the U.S.A. As a result of Argentine expansionism and Franklin D. Roosevelt's "good neighbour" policy, friendship with the U.S.A. became the most important consideration in Brazil's foreign policy. But the traditional Anglo-Brazilian friendship in cultural matters remained a very real bond.

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1. Great steel works in the valley of the Parahyba river. 2. Pickers at work in an orange grove. 3. Young worker carrying a sack of freshly picked cotton. 4. Two Indian hunters from the interior; they are holding blowpipes from which they discharge poisoned arrows at their

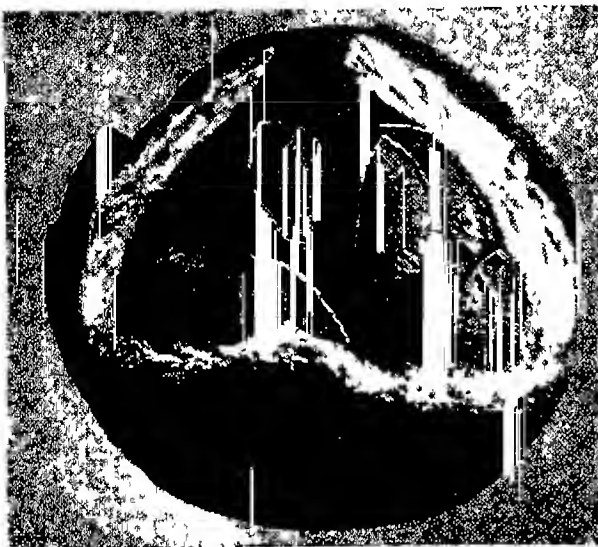
prey. 5. Rubber plantation at Belterra, covering some 700,000 acres of former jungle country. 6. Farm hand spreading coffee berries to dry. 7. Outdoor café in Rio de Janeiro. 8. Glimpse of the vast river Amazon at Paredão, near Manáos, 1,000 m. above its mouth.

BRAZIL: VARIED SCENES FROM DIFFERENT PARTS OF THE VAST REPUBLIC

Photos, 1, Keystone; 2, 3 and 5 E.N.A.; 4 and 7, Dorien Leigh; 6, New York Times; 8, Booth Steamship Co., Ltd.

Brazilianite. Mineral occurring in monoclinic crystals; first reported in 1945 from Brazil, whence the name. Chemically a hydrous sodium aluminium phosphate, it is yellow in colour. Crystals occur in altered granitic pegmatite. Gemstones have been cut, but brazilianite is soft, and in brilliance does not surpass the more durable yellow beryl.

Brazil Nut (*Bertholletia excelsa*). Seed of a very tall tree of the family Lecythidiaceae. It is a



Brazil Nuts in pod. Each pod contains about 20 nuts

native of Brazil, Guiana, and Venezuela. On the Amazon and the Rio Negro it grows in large forests and attains a height of 150 ft., with smooth trunk of great cylindrical girth. Its oblong leaves are each about 6 ft. long. The cream-coloured flowers are succeeded by spherical fruits, thick woody capsules each containing about 20 rough-shelled triangular nuts. The kernels yield about 70 p.c. of a lubricating and bland edible oil.

Brazilwood. Term used to describe the red dyewoods derived from various species of *Caesalpinia*. *C. crista* provides Pernambuco wood, *C. braziliensis*, true Brazilwood, and *C. sappan*, sappanwood. These very hard woods yield their colour on boiling with water and the commercial preparations are Brazilwood extract and liquor. The important ingredient of brazilwood is a natural dyestuff, brazilin, first isolated in 1808. Brazilwood dyes have lost their importance in industry owing to their fugitive character.

Brazing. A process of hard-soldering, involving partial fusion by which the surfaces of metals or alloys may be joined. The joint is made by inserting a copper-zinc or copper-zinc-silver alloy known as "brazing solder," a flux such as borax being generally employed to remove oxide films that may form. British Standard specifications recognize three grades of brazing solder. The addition of silver up to 50 p.c. lowers the

melting point of these alloys and increases their fluidity. The joint strength obtained by brazing is much higher than that in ordinary soft soldering, and may even be greater than 40 tons per sq. in. The latest type of brazing employs only pure copper as the jointing metal. See Soldering; Welding.

Brazza (Yug. Brač). Island of Yugoslavia, the largest of the Dalmatian archipelago. Mountainous and well wooded, it lies S. of Split, between the island of Lesina (Hvar) and the Dalmatian mainland. Products include olives, figs, almonds, saffron, and wine. Silkworms are reared, and there are good marble quarries. Area 150 sq. m. Pop. (1950) 14,694.

Brazza, PIERRE PAUL FRANÇOIS CAMILLE, COMTE SAVORGNAN DE (1852-1905). French explorer and administrator, one of the chief colonisers of French Equatorial Africa. Born near Rome Jan. 26, 1852, of Italian parentage, he was educated at the Jesuit college in Paris and at the naval college, Brest. He entered the French navy and became a naturalised Frenchman. During 1875-78 he

1883, and during 1886-98 was commissioner-general of the French Congo. He died at Dakar, Senegal, Sept. 4, 1905.

Brazzaville. Town of French Equatorial Africa, capital of the Middle Congo, and an active river port on the Congo river. It lies N.W. of Stanley Pool and is connected by rly. (320 m.) with Pointe Noire, at the mouth of the Congo. It was founded by the explorer Savorgnan de Brazza, hence its name. The seat of the governor-general, it is a flourishing city with colleges, law courts, a hospital, a Pasteur institute, a stadium seating 30,000, and a cathedral. 1892. There are sawmills, smelting works, spinning and weaving mills; cigarette, soap, furniture, ceramic, ready-made clothing factories; breweries, brickworks, shipbuilding yards.

During the Second Great War, Brazzaville was the African h.q. of Free (later called Fighting) French forces. Pop. (est.) 120,000, including 6,000 Europeans.

Breaching Tower or BELFRY. Movable wooden structure used for attack in ancient and medieval siegecraft. It

consisted of a stoutly built shed of several storeys on wheels, which could be pushed or pulled up to the walls. It was fitted with drawbridges for landing, and protected against fire by water tanks and screens of raw hide, osier, or twisted rope. The ground floor often contained one or more battering rams, the higher floors were fitted with other missile engines, and the top floor carried the archers and slingers.



Breaching tower, containing archers and supported by cannon and crossbow-men, in action against a fortress

explored the Ogowé river and also discovered the Alima and Likona rivers, afterwards found to be tributaries of the Congo. On a second expedition, 1880-82, he founded Franceville on the Ogowé and reached the Congo at Stanley Pool. Here he established a settlement which afterwards developed into Brazzaville (v.i.). His treaties with the local chief, placing the region under French protection, were later ratified in Paris. He returned to Africa in

Breach of Promise. Breach of a contract to marry. The party not in breach may sue the other party for damages. The promise need not be in writing but there must be some corroboration—e.g. a letter, or the conduct of the defendant. The action is normally tried by a judge and jury and does not come within the legal aid scheme. Actions by the man are unusual but not unknown. Damages recoverable include financial loss—e.g. cost of a wasted

trousseau—and such sum as the jury think appropriate for injury to the plaintiff's affections and prospects of marriage, and to mark their disapproval of the conduct of the defendant. Where the party who broke the promise has died, his or her estate may be sued, although the damages are limited. A person under 21 cannot be sued for breach but can sue. If a person already married goes through a form of marriage with another person who is unaware of the earlier marriage, the person deceived may sue for breach of promise and for fraud.

Defences to an action include: unchastity of the plaintiff (if a woman) before the promise if this was unknown to the defendant; (in some cases) serious ill-health of the plaintiff (but not of the defendant) arising after the promise; release from the promise—i.e. mutual breaking off of the engagement. The person who unjustifiably breaks the promise must hand back all presents given in contemplation of the marriage, including any engagement ring, and cannot claim back any such presents he or she gave.

Bread (A.S. *breod*). Food made from flour moistened with water and baked to form loaves; leavened bread has yeast or other raising element added. Bread is the basic food of most of the white peoples and a luxury to many of the others. It has been developed during the ages from a tough, leathery mass of water and semi-ground cereal mixed and baked to the cellular creamy interior and brown crust of today. Its development has been closely allied to that of beer and wine in that improved methods of fermentation have played a large part. Bread contains water, proteins, carbohydrates, fat, ash, cellulose, common salt, and vitamins, vitamin B predominating.

History of Bread

Bread-making developed when man began to cultivate food-plants, which happened at the dawn of the Neolithic Age somewhere in the Near East—in Egypt, Syria, or Mesopotamia. The cultivation of the wild forms of wheat and barley brought about improvement in their quality and these cereals are found carefully harvested and preserved in storage pits in sites in the Fayum, Egypt, dating from the 5th millennium B.C. To make bread the grain was ground by a rubbing-stone pushed to and fro on another slightly

curved stone, the saddle quern. The cake of dough was probably baked by laying it on a heated stone and covering it with ash. Fragments of such cakes have been found in Swiss lake-dwellings of the Neolithic period.

The civilized peoples of antiquity greatly improved the quality of bread. The Egyptians produced loaves of fine quality and Greek and Latin literature contains a good deal of information about the many varieties of bread popular in the ancient world. White loaves were specially appreciated, and special devices for sieving and purifying the flour were developed. Public bake-houses are said to have existed in Rome by 160 B.C., and some are to be seen in the ruins of Pompeii.

Bread, as the basic human food, plays a part in the ritual of many religions. The ancient Hebrews had their shewbread (1 Sam. 21, v. 6), sacred loaves were used in the worship of Ceres, and bread and wine are used in the Holy Communion service, the chief rite of Christendom.

During the Middle Ages in England the bakers of brown and of white bread had separate guilds which regulated weight and quality and the use of adulterants. The best white flour was used for simnel bread or *pain demayn* (early Fr., bread of Our Lord), later corrupted into *payman*. The figure of the Virgin Mary or of Jesus Christ was impressed on each loaf. The next grade was used in wastel bread, which contained fruit and spices, was a luxury, and is mentioned in Chaucer's Prologue as the bread with which the Nonne fed her pets. Cocket was the next best in quality and was so named because of the "cocket" or seal impressed on each loaf. Some unbolted meal was used in the making of tourte-bread, a loaf having a twisted (tort) form. Trite bread (O.E. bran), similar to modern brown bread, was made from once bolted meal.

Current Methods of Making

Bread can be made from most cereals or mixtures of cereals. Wheat is necessary to obtain a cellular structure because flour made from wheat contains 8–16 p.c. of protein matter named gluten. Bread without gluten is "close" and leathery. The usual process for making bread is to mix flour, water, salt, and yeast plus enriching agents such as fat.

The flour varies according to the type of wheat and the processes

of milling. It is "strong" or "soft," according to the gluten content. In the U.K. normally only 70 p.c. of the flour is extracted from the milled wheat; but at the outbreak of the Second Great War flour came under government control, and until Aug., 1953, when flour was decontrolled, extraction was as high as 85 p.c. This gave a higher natural vitamin content to the loaf. The amount of yeast used is determined by the time the mixture or dough is allowed to stand and by the temperature at which it is mixed.

From Aug., 1953, millers were free to mill flour at whatever extraction rate their customers demanded, and bakers were free to bake and sell the bread according to demand; bakers were also permitted to introduce a prescribed minimum of skim milk powder into bread made of national flour to produce a "milk loaf," for which they could make a reasonable charge above the maximum controlled price for the national loaf. National bread, made of flour of 80 p.c. extraction, enriched with added substances, continued until 1956 to be subsidised and sold at a controlled price, and it had to be on sale wherever bread made from whiter flour of a lower extraction rate was sold. Although control had been lifted, certain provisions recommended by the Post-War Loaf Conference of 1945 were enforced to maintain standards. All home-produced and imported flour of a lower extraction rate than 80 p.c. had to have restored to it three important nutrients lost in the refining process, namely, per 100 grams of flour, 1.65 mg. of iron, 0.24 mg. of vitamin B₁, and 1.60 mg. of nicotinic acid. Calcium, in the form of creta praeparata, is also added to all flour other than true whole-meal flour, i.e. flour produced from the whole of the wheat grain and with no addition. It is thought that without this addition of creta praeparata the calcium content of the national diet would be well below the level considered by medical authorities to be necessary for health.

The atmospheric and hygienic conditions of a bakery govern to a great extent the quality of the bread produced. Bread is liable to attack from various moulds, spores, and fungoid growths. *Penicillium glaucum*, a type of green mould, attacks the outside of a loaf if conditions are favourable to it. "Rope" produced by *Bacillus mesentericus* is generally present in

flour and if uncontrolled can produce an evil-smelling, sticky, and elastic inside to a loaf.

The making of good bread depends upon an almost intuitive knowledge of flours, doughs, and fermentation; consequently the development of machinery in the bakery trade has been comparatively slow. Nevertheless, there are automatic plants that will turn ten sacks of flour (2,800 lb.) into bread per hour (*i.e.* about 1,800 large—reputed 2-lb.—loaves). The more usual plant consists of the flour sifter, water tempering tank, mixer, prover, and oven, often with a divider and moulder.

BAKERS' QUALIFICATIONS. The bread baker needs long practical training combined with a knowledge of food chemistry, engineering, and hygiene. His trade education is by apprenticeship and organized technical classes.

The usual examination for proficiency in bread-baking in England is that of the City and Guilds, London. There are many scholarships to cover part and whole-time education. Bread-making competitions are held in most parts of the U.K. A bakery trade exhibition and competition is held annually in London.

Most towns in the U.K. have a master bakers' association and a bakery students' society. The students are affiliated to the National Federation of Bakery Students' Societies and the master bakers to the National Association of Master Bakers and Confectioners and Caterers. The larger plant bakeries have their own associations. There are the Bakery Trades Executives' Guild, Bakery Workers' Guild, and Amalgamated Union of Operative Bakers, Confectioners, and Allied Workers. The Worshipful Company of Bakers is one of the City of London livery companies.

Breadalbane. A district of West Perthshire, Scotland. Mainly mountainous, it contains several lofty peaks of the Grampian range, Ben Lawers (3,984 ft.), Ben More (3,843 ft.), and Ben Lui (3,708 ft.) being the highest. It is drained by the Tay, Almond, Dochart, Orchy, and other streams, and among the lochs are the Tay and Rannoch. It has extensive deer-forests and is noted for lake and river fishing. The Campbells of Glenorchy derive their titles of earl and marquess from the district.

Breadalbane, EARL OF. Scottish title borne since 1681 by the family of Campbell. Sir Duncan

Campbell of Glenorchy, created a baronet in 1625, was the ancestor of Sir John Campbell (*c.* 1636–1717), the 5th baronet, created earl of Breadalbane in 1681. This first earl helped to govern Scotland under Charles II, and submitted to William III. Among those who arranged the massacre of Glencoe, in 1708 and 1715 he was in league with the Jacobites. John, the 3rd earl, an M.P. and a supporter of Walpole, was British ambassador at Copenhagen and St. Petersburg.

Cavin, the 7th earl, was made a peer of the United Kingdom in 1873, and in 1885 the marquessate was revived in his favour. As a Liberal he was treasurer of the royal household 1880–85, and lord-steward 1892–95. Taymouth Castle, Perthshire, was his chief seat. On his death, Oct. 19, 1922, the marquessate again expired. Charles William (b. 1889) became 9th earl in 1923. The heir is known as Viscount Glenorchy.

Bread-fruit (*Artocarpus incisa*). Fruit of a fine tree of the family Moraceae. A native of the South



Bread-fruit. Leaves and fruit of *Artocarpus incisa*

Sea Islands, it attains a height of 50 ft., and has leaves 2 ft.–3 ft. long, deeply cut from the edges into lobes. The male flowers are crowded into a long spike and the females in a globular head, which after fertilisation expands into the fruit. This is as large as a melon, and filled with starchy pulp. When roasted the interior is bread-like, though without flavour. In a less ripe state the fruit contains a tenacious white milk. By selection and cultivation seedless varieties have been evolved, as in the banana.

Bread-nut Tree (*Brosimum alicastrum*). Evergreen tree of the family Moraceae. It is a native of Jamaica. It possesses lance-shaped leaves and simple yellow flowers massed in globular heads. The so-called nuts are really berries about an inch across. When boiled or toasted they are used for food, and have the flavour of hazel-nuts. The leaves and shoots are used as fodder for cattle, and the mahogany-like wood is often employed by local cabinet-makers.

Bread-root (*Psoralea esculenta*). Perennial herb of the family Leguminosae. It is a native of N.W. America. Its insipid tuberous roots are eaten by the abori-

gines. The plant grows to the height of a foot, and has leaves divided into five leaflets. The blue flowers form roundish heads and are succeeded by one-seeded rough pods.

Bread-tree (*Alibertia edulis*). Small evergreen tree of the natural family Rubiaceae. It is a native of Guiana. It has opposite, oblong, leathery leaves, cream-coloured tubular flowers at the ends of the branches, and edible fruits.

Break. Term in billiards, a series of consecutive scoring strokes in one visit to the table. A break is built up of a variety of shots, cannons, and losing and winning hazards. In order to make a break the player must play for position. That is, he must not be content merely to make the score that is obvious, but by employing a certain degree of strength in his stroke, by imparting side or bias to his own ball, by hitting it in a certain place and thereby widening or reducing the angle it will describe after contact with the object ball, he must leave the balls in such a position that another scoring shot is reasonably easy. To make a big break, it is necessary for the striker to think several strokes ahead. See Billiards.

Break. In cricket, a change of direction by a ball after it has pitched on the ground. This break or spin may be to right or left and is imparted by the bowler holding the ball before delivery so that his fingers are placed in the desired position relative to the seam of the ball. A leg-break is a delivery which turns into the wicket from the batsman's leg side; an off-break comes in from the opposite side. Part of the batsman's art is in detecting the break before the ball pitches, but he may be deceived by a googly (*q.v.*), an off-break bowled with a leg-break action. The leg-before-wicket rule is complicated by break.

Breakspear, NICHOLAS (*c.* 1100–59). The only Englishman to become pope. On his election to the papacy he took the name Adrian IV (*q.v.*).

Breakwater. An artificial bank raised as a protection against the sea. A breakwater usually forms part of an artificial harbour where the land provides little or no natural protection for shipping; its purpose is to protect from the open sea an area of water which can be used as an anchorage or harbour. Breakwaters are also sometimes used to protect the entrances to navigable channels and docks. Breakwaters vary considerably both in design and

in construction. They may be in the form of large groynes, or big enough to form the quays of a harbour. A protective wall or parapet on the exposed face may be carried up above the top level of the breakwater. The "barrier effect" is not only against rough seas: a breakwater at an entrance channel often also arrests the littoral drift.

Harbour Protection

Breakwaters forming harbours usually begin from the coast-line at some defined angle, then extend seawards (fig. 1). At a given distance out they turn, thus enclosing an area of water forming the harbour. If the breakwater is to continue inwards, to meet the coast again, a gap is left, at the most suitable point, to give access from the sea to the protected area of water.

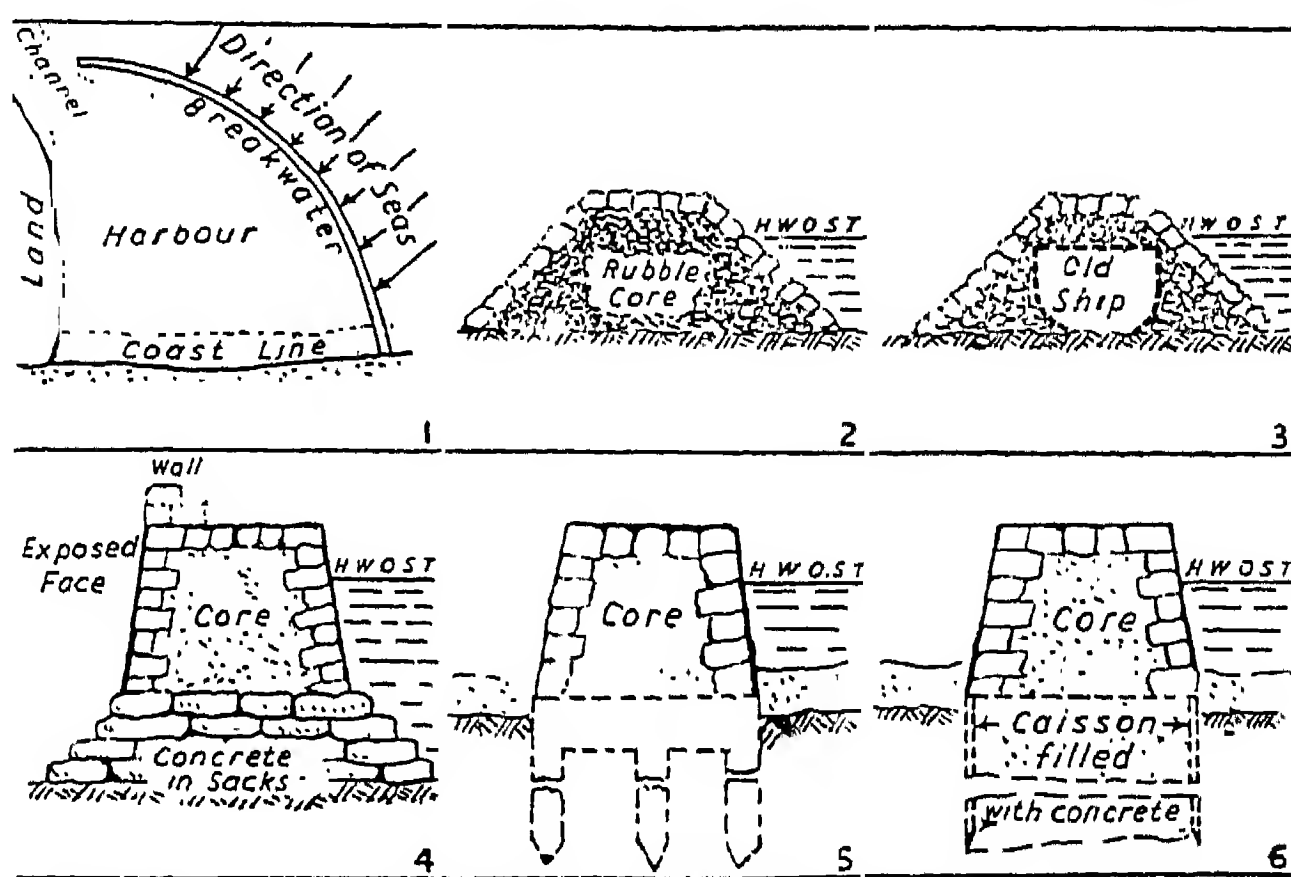
The configuration of the coast may itself provide a natural barrier, so that it is necessary only to construct a breakwater on the weather side to form a harbour. When the prevailing weather conditions and drift are towards the shore, protection parallel to the shore is necessary.

Breakwaters must be carefully designed and strongly constructed to withstand exceptional sea and weather stresses. Wave pressures vary considerably, but intensities as high as $3\frac{1}{2}$ tons per sq. ft. have been recorded. These high pressures act like hammer-blows on the structure of a breakwater and their frequency depends upon the wave amplitude, which sets up vibration. These successive hammer-blows tend to disintegrate the constructional work, and on occasions huge blocks, as heavy as 40 tons each, have been dislodged.

Moreover the foreshore upon which the breakwater rests may be so scoured or denuded of its normal protective deposit that the breakwater foundations are undermined. This is due to the intense wave reaction set up by the breakwater itself, and to the diversionary effect upon the littoral drift.

Methods of Structure

The tide range, wave reach, prevailing weather conditions, and natural foundation of the site of a proposed breakwater govern the method of its construction. In the simplest type, rubble mounds are built up from the foreshore or sea bed by controlled tipping. The stones forming the breakwater are tipped to form a



Breakwater. 1. Position of breakwater forming a harbour. 2. Rubble type. 3. Old ship forming core. 4. Concrete foundation for a superstructure with stone-faced walls. 5. Breakwater built on piles. 6. Caisson method of construction (H.W.O.S.T., high water ordinary spring tides)

section somewhat similar to fig. 2. Such stones are usually graded, the heavier forming the outer or exposed faces, the smaller forming the core.

Materials so deposited assume a natural slope of 30° to 45° , which slope determines the width of the work once the top width has been settled. Stones used in this method of construction cannot be bonded, but additional stability can be given by cement grouting. This type of construction needs enormous quantities of stones and is costly. A notable example of the rubble breakwater is at Plymouth, which contains approx. 4,000,000 tons of stones. The widest breakwater of this type is at Holyhead (460 ft.), the deepest at Alderney (100 ft.), and the longest at Cherbourg ($2\frac{1}{2}$ m.). Sometimes old ships are sunk on the desired line of the breakwater and filled with concrete to form a heavy core (fig. 3) over which protective stonework can be deposited.

In another method the section consists of a stone-faced wall each side, behind which rough concrete is laid. The stones are usually dressed, laid in random courses, and bonded. Concrete blocks up to 40 tons in weight are sometimes used instead of stone.

Base and Superstructure

On some sites the foundation must be consolidated first to provide a secure base and then brought up to take the superstructure. If the water is not too deep the foundation can be brought up by consolidating with concrete placed in sacks.

A typical section of this kind is shown in fig. 4. The superstructure consists of two heavy stone-faced walls, behind which the hearting of rubble or rough concrete is placed as each course is completed. The advantage of a stone facing is that in practice it is often difficult to ensure correct alinement of the heavy shuttering required to construct a suitable concrete facing.

Alternatively, suitable piles can be driven at intervals along the line of the proposed breakwater to the depths at which a satisfactory resistance is reached. The pile heads are then tied together and incorporated in the base for the superstructure (fig. 5).

Use of Caissons

Caissons are used in breakwater and harbour construction, as is shown in fig. 6. The buoyancy of the caissons, of iron or reinforced concrete, is sufficient for them to be towed to the site of the proposed breakwater, where they are sunk in position by admitting water or adding concrete to them. Air-locks inside the caisson make it possible to continue excavation under water, the water pressure outside being neutralised by compressed air inside.

When a firm subsoil has been reached the caisson is completely filled with concrete and forms a foundation to receive the breakwater. Caissons are sometimes placed at intervals, sometimes close together; across them is laid a heavy concrete cap which ties the whole structure together. During the Allied landings in Normandy in 1944, concrete caissons made in

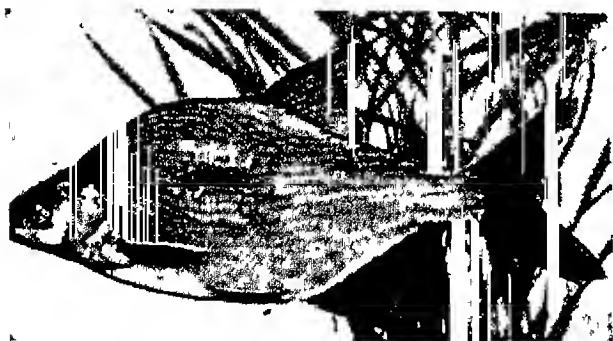
Great Britain were towed across the Channel to form breakwaters for the "Mulberry" (q.v.) harbours constructed successfully at Arromanches, and less successfully at the east coast of the Cotentin peninsular.

Protecting the Foundations

If the foreshore in the immediate vicinity of the breakwater is unstable it is sometimes necessary to provide protection against the undermining of the foundations. Aprons are constructed in the form of stone pitched slopes on the seaward face of the breakwater, increasing in height towards the superstructure or main protective wall. The slope is extended to the position of maximum wave reaction and is sometimes terminated with a concrete berm (horizontal ledge). Maximum wave reaction will occur where the waves recoiling from the breakwater meet the oncoming seas.

Bréal, MICHEL JULES ALFRED (1832-1915). French philologist, founder of the science of semantics. Born of French parentage, March 26, 1832, at Landau, Bavaria, he was educated at Wissembourg, Metz, and Paris. In 1857 he went to Berlin, where he studied philology under Franz Bopp and Ernst Weber. After working in the Bibliothèque Impériale in Paris, he was professor of comparative grammar in the Collège de France, 1866-1905. His *Essai de Sémantique*, 1897, became the standard work on the study of the meaning of words. Other works were a translation into French of Bopp's grammar, 1866-74, and an etymological Latin dictionary, 1885. He died Nov. 25, 1915.

Bream. Name given to some fifteen species of fresh-water fish of the genus *Abramis*, allied to the carp. The only British species are the common bream (*A. brama*) and



Bream, a fresh-water fish. The common bream, *Abramis brama*

the white bream (*A. blicca*). In Ireland these sometimes attain a weight of 14 lb. Being free and rather bold feeders, bream are often taken in large numbers after ground-baiting. Their flesh has little to recommend it. They may be recognized by their deep and

laterally compressed body and the shortness of the dorsal fin. The sea bream (*Pagellus centrodontus*) is in no way allied to the fresh-water breams. See Sea Bream.

Breast. In human anatomy, the mammary gland of the female. The breast varies considerably in position, size, and shape among different races and in different women. In the young girl, and before suckling, the breast is attached fairly high to the thorax and tends to be more or less conical in shape. This is the form which is generally most admired by sculptors, and is the type most frequently represented in ancient Greek statuary. In older women, and after the breast has subserved its normal function, it becomes more elongated and pendulous, and in some primitive races the length is so great that the mother is able to carry her child on her back and suckle it by means of the breast thrown over the shoulder.

In structure the breast consists of a number of lobes subdivided into lobules in which the milk is secreted, and which terminate in the milk-ducts opening on the nipple. During pregnancy the breast enlarges and becomes firmer, the veins are more prominent, and the pigmentation round the nipple is more marked.

DISEASES OF THE BREAST. Acute inflammation of the breast is most likely to occur in pregnant women and during the first month after delivery, the most frequent cause being infection through a sore or crack on the nipple. Suppuration may lead to formation of an abscess. The condition is one which calls for prompt medical attention, for it may not only injure the mother's health but may harm the infant by interfering with feeding. Chronic inflammation may occur after the infant is weaned, or may be the result of a blow, or may occur in women who are nearing the "change of life." Engorgement can be controlled by treatment with appropriate endocrine substances.

Cancer attacks the breast more frequently than any other organ of the body in the female, with the possible exception of the uterus. The death rate, however, from cancer of the breast is higher than that from cancer of the uterus. The disease is about equally prevalent in the single and married up to the age of 45, but after that age it is much more common in the single than in the married and widowed. Cancer of the breast can only be cured by a surgical

operation for the removal of the breast and the adjacent tissues and organs which are affected. The operation, though large and serious, is not in itself dangerous to women who are otherwise healthy. When the disease is recognized early, and while it is confined to the breast, prospects of permanent recovery are very good; long delay probably means the disease has spread too far for eradication. Contrary to popular belief, pain is a late symptom in cancer. In rare cases the rudimentary breast in the male may become the seat of cancer; any tumour in the male breast should cause immediate anxiety. Other forms of tumour may affect the breast, but none is so serious as cancer.

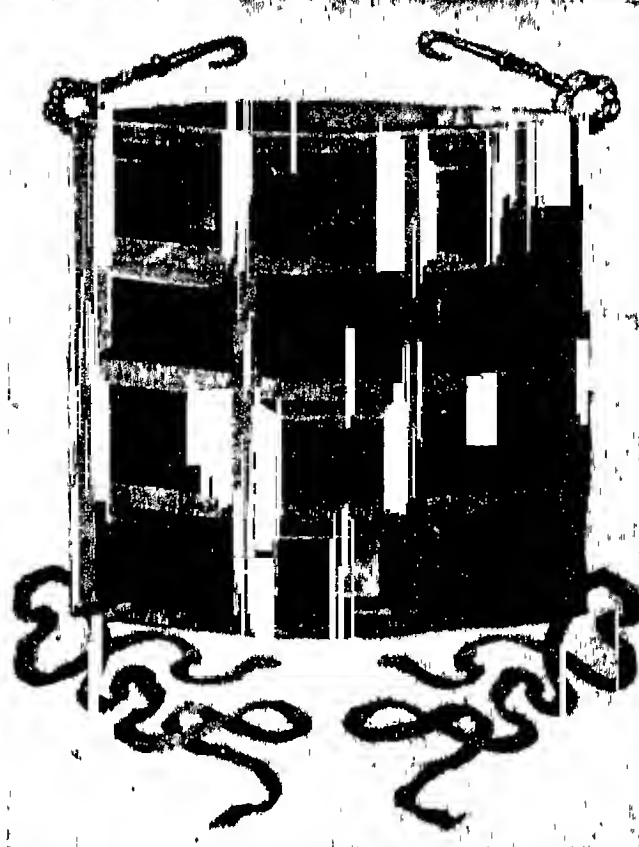
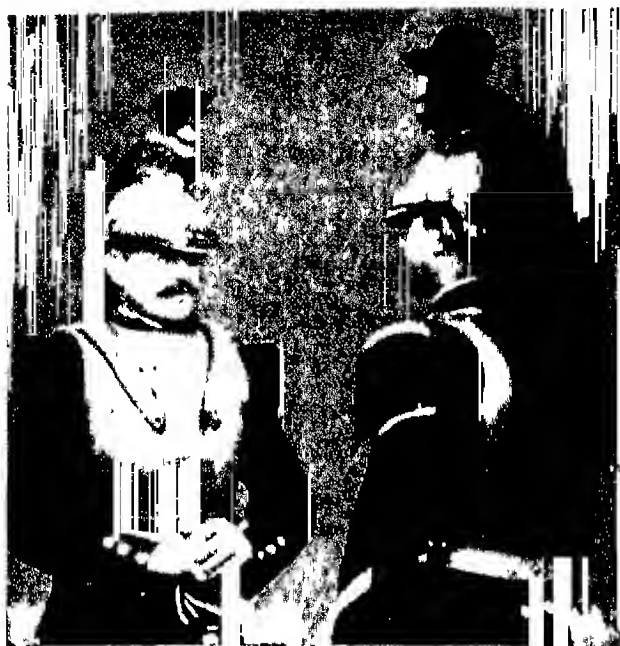
Breast-Bone OR STERNUM. In anatomy, the bone which forms the central part of the front of the chest of warm-blooded vertebrates. In the human being it consists of three main parts. The upper, called the manubrium, articulates with the clavicle or collar-bone on each side. It has a deep notch on the upper border, which forms the base of the pit of the neck. The sides of the manubrium articulate with the first pair of ribs.

The second portion or body is attached to the manubrium above, and on the point of juncture articulates with the second pair of ribs. It is marked on the surface by three slight transverse elevations, indicating separate segments from which the body was originally formed. The third, fourth, and fifth pairs of ribs articulate with the body opposite these ridges, and the sixth pair articulates with it near the lower end.

The third part, the ensiform process, remains cartilaginous until some years after birth. It is attached above to the body of the sternum, and articulates here with the seventh pair of ribs.

Pigeon-breast is a condition caused by rickets in which, owing to the sinking in of the ribs, the sternum becomes unduly prominent. Funnel-breast is a condition in which the central part of the sternum is deeply depressed. It is sometimes seen in cobblers as a result of long-continued pressure against the chest while at work.

The marrow in the cavity of this bone is easily accessible, and under a local anaesthetic a specimen can be withdrawn by a trochar and canula. When it is examined under the microscope valuable information about the condition of the blood-forming mechanisms of the body is obtained.



Breastplate. 1. Worn by French cuirassiers. 2. English Life Guards officer's breastplate. 3. Spanish, 16th cent., with pattern in silver relief. 4. Breastplate with precious stones, representing the twelve tribes, worn by Jewish high priest

Breasted, JAMES HENRY (1865-1935). American Egyptologist. Born at Rockford, Illinois, Aug. 27, 1865, he studied at Chicago, Yale, and Berlin. He collected in Egypt for Chicago university, 1894-95, and during 1900-01 collated documents in European museums for the Imperial Egyptian Dictionary. His *History of Egypt to the Persian Conquest*, 1906, was based on all available historical source-material (which he published in trans. as *Ancient Records of Egypt*, 5 vols., 1905-07). His more popular work *Ancient Times* was revised in 1935. Made professor of Egyptology and Oriental History at Chicago in 1905, he directed its Nubian expeditions, 1905-07, publishing *The Temples of Lower Nubia*, 1906, and *The Monuments of Sudanese Nubia*, 1908. Director from 1919 of the Oriental Institute at Chicago, he died Dec. 2, 1935.

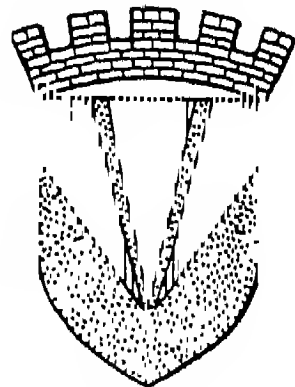
Breastplate. Piece of defensive armour for the breast. It was used by Greeks and other early soldiers, beautiful examples having been found at Mycenae; also by the Romans. The introduction of suits of armour made it unnecessary.

It appears to have been made first of leather, then of bronze or brass.

The term breastplate is also applied to a part of the dress worn in the sanctuary by the Jewish high priest (Exod. 28 and 39). It was a kind of pouch or pocket, of richly embroidered cloth, attached to the ephod or waistcoat, set with twelve precious stones engraven with the names of each of the twelve tribes of Israel, and containing the Urim and Thummim by means of which the Divine will might be ascertained (1 Sam. 28). It is also called the memorial, because it served to remind the high priest of his representative character; and the breastplate of judgment.

Breath (A.S. *braedh*). Name given to both the act and time of respiration (*q.v.*).

Brechin. City, royal burgh, and market town of Angus county, Scotland. It is on the South Esk, and lies 8 m. W. of Montrose. It makes linen, sailcloth, jute and rayon cloth, machine tools, electrical goods, and whisky. An ancient city, it was sacked by the Danes in 1012, created a bishopric, 1150, and has a 13th-century cathedral (used as the parish church), a round tower, and other antiquities. It was burnt by Montrose in 1645. Brechin Castle near by is the seat of the earls of Dalhousie. Market day, Tues. Pop. (1951) 7,264.



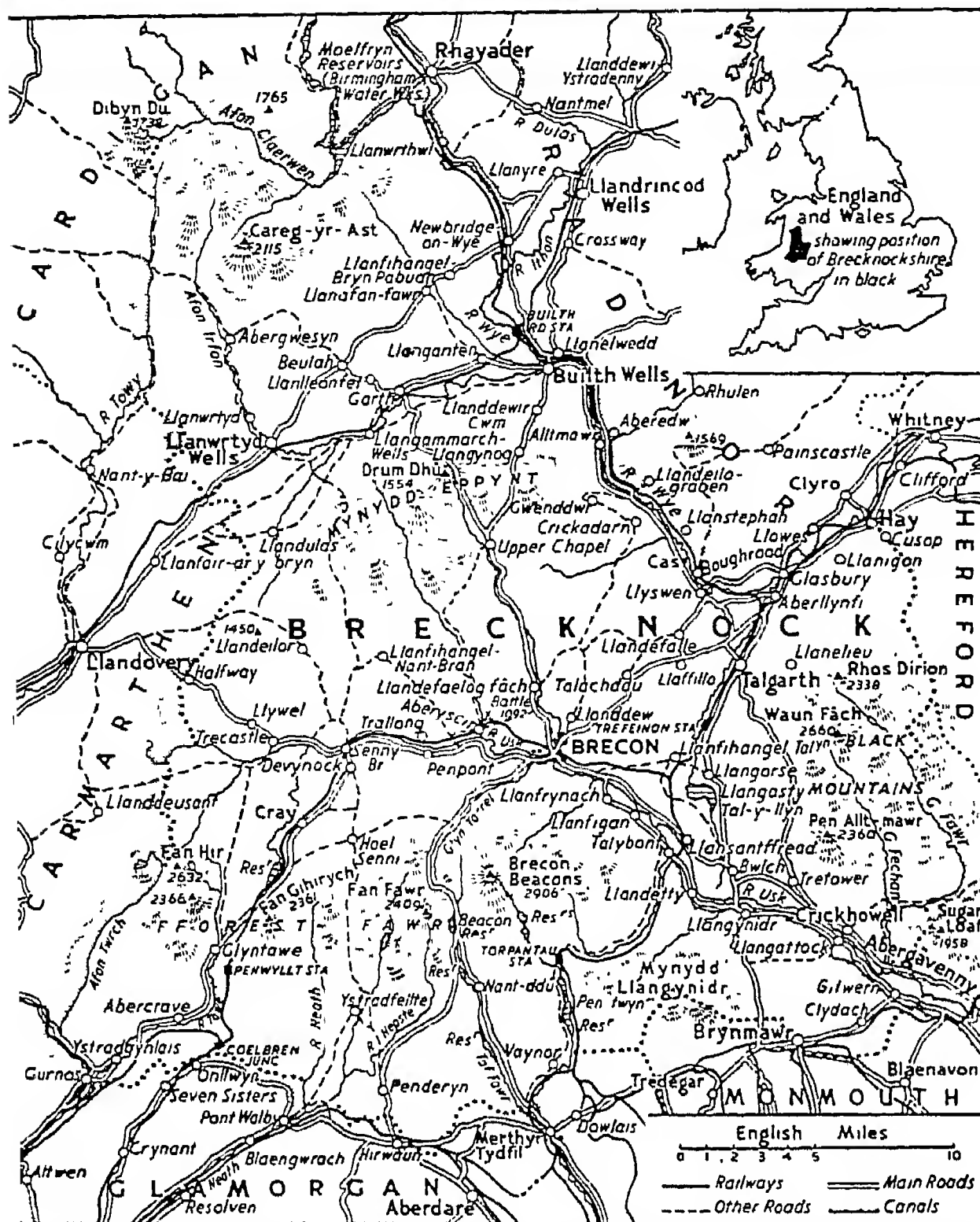
Brechin arms

Brecht, BERTOLD (1898-1956). German poet and playwright. Born at Augsburg Feb. 10, 1898, he went to Munich and Berlin universities. After the First Great War he became a Communist. His first plays *Trommeln in der Nacht* (drums in the night) and *Baal* won the Kleist literary prize in 1922. *Die Dreigroschenoper* (an adaptation of *The Beggar's Opera*), with music by Kurt Weill, produced 1929, brought him international fame; the work was produced in London (as *The Threepenny Opera*) in 1955. In 1933 Brecht fled abroad. He returned to E. Germany in 1948, and created his own company which achieved considerable artistic success in *Mutter Courage und ihre Kinder* (mother Courage and her children), *Der kaukasische Kreidekreis* (the Caucasian chalk circle), and others of his plays. He published vols. of satirical poems and ballads, 1927, 1934, and 1939. Brecht died in East Berlin on Aug. 14, 1956.

Breckinridge, JOHN CABELL (1821-75). American soldier and politician. Born near Lexington, Kentucky, Jan. 21, 1821, he became a lawyer. He served in the Mexican War, and was elected to Congress in 1851. Chosen vice-president of the U.S.A. in 1856, he was nominated for the presidency in 1860 by a section of the Democrats. Douglas was nominated by another section, with the result that



Brechin. The 13th century cathedral and ancient round tower, 100 ft high



Brecknockshire. Inland county of South Wales, notable for its mountain chains and deep, fertile valleys. It is watered by the rivers Wye and Usk

Lincoln, the Republican candidate, was elected. Breckinridge at once supported the secession of the South and joined the Confederate army. He took part in the battles of Shiloh, Chickamauga, and Cold Harbor, and was Jefferson Davis's war secretary in 1865. He died at Lexington, May 17, 1875.

Brecknockshire OR **BRECONSHIRE.** South-east county of Wales. Lying next to the boundary between the principality and England, its greatest length is 38 m., greatest breadth 33 m., and its area 733 sq. m. Its beauty is enhanced by three mt. ranges, separated by the valleys of the Usk and Yrfon, which attain their highest alt. in Pen-y-Fan (2,907 ft.), the loftiest summit of the Brecon Beacons and of S. Wales. The chief rivers are the Wye, partly separating the county from Radnorshire, and the Usk. The soil, except in the valleys, is not generally adaptable to cultivation.

Part of the county lies within the Welsh coalfield, and iron, copper, lead, and limestone are

found. There are several flourishing ironworks. The worsted and woollen industries have declined. The county is intersected by the railway and by the Brecon and Abergavenny Canal. Welsh is the language of more than half the population. With Radnorshire it forms a county constituency. The most important towns are Brecon (county town), Brynmawr, Builth Wells, Crickhowell, Hay. Pop. (1951) 56,508.

Occupied by the Romans about A.D. 75, Brecon was taken from the Welsh by the Saxons in 728, and became a stronghold of the Normans. Llewellyn, the last of the Welsh Black Princes, met his death near Builth in 1282. Remains of stone circles, cairns, and cromlechs are among the relics of the British and Roman periods. *Consult* History of the County of Brecknock, T. Jones, 1930.

Brecon OR **BRECKNOCK.** Borough and county town; also market town of Brecknockshire, Wales. It is on the river Usk, 35 m. N. of Cardiff by railway. A British town and a Roman station, it is

picturesquely placed, and has a collegiate school founded by Henry VIII. The industries are mainly agricultural. Henry Vaughan, the poet, was a physician here, and Mrs. Siddons was a native. Market day, Fri. Pop. (1951) 6,470.

Breda. Large Italian aircraft manufacturing company of Milan. Breda aircraft, notably the type 65 bomber-fighter monoplane and the type 88 Lince bomber, were used by the Italians in North Africa during the Second Great War. The bomber-fighter was fitted with a 1,000 h.p. Fiat radial engine and armed with four Breda-Safat machine-guns. The Lince was a twin-engined machine.

Breda. Town of the Netherlands, in North Brabant. It is situated at the confluence of the Aa and the Merk, 59 m. by rly. E.N.E. of Flushing. The principal church, near the market place, dates from the 13th century. The old fortifications were dismantled in 1876. Carpets, cloth, and hats are manufactured. The surrender of Breda to the Spaniards, June, 1625, is the subject of Velazquez's painting *Las Lanzas*. The treaty of Breda, July, 1667, closed the Second Dutch War, 1665-67. On May 11, 1940, German parachutists seized key-points in and around Breda, which was not liberated until Oct. 29, 1944; the town was undamaged. Pop. (1947) 85,294.

Breda, DECLARATION OF. Proclamation issued by Charles II just before his restoration. Dated April 4, 1660, it promised that, if restored, he would, subject to the assent of parliament, grant a full amnesty, liberty of conscience, settlement of all claims to landed property, and payment of arrears to Monk's soldiers.

Brederode, COUNT HENRY OF (1531-68). One of the leaders of the beginning of the revolt of the Netherlands against Spain. Born at Brussels in Dec., 1531, he belonged to an old and noble family. About 1560 he embraced the reformed religion and became a supporter of William the Silent, prince of Orange. On April 5, 1566, at the head of a troop of 200 horsemen, he presented to the governor of the Low Countries, Margaret of Parma, a petition against the tyranny of Cardinal Granvelle. Five days later he gave a great feast in Brussels at which 300 nobles banded themselves together into the company of the *Gueux* (beggars) vowed to oppose Spanish tyranny in the Netherlands. The duke of Alva, who had succeeded Margaret as governor, banished Brederode

in 1567. He died in exile in Germany Feb. 15, 1568.

Brederoo, GERBRAND ADRI AANSLOON (1585-1618). Dutch poet and dramatist. Born in Amsterdam, March 16, 1585, the son of a shoemaker, he began life as an artist. He ranks as the greatest comic dramatist of Holland. The best of his plays are *Het Moortje* (1615) and *De Spaansche Brabander* (1618). He died Aug. 23, 1618.

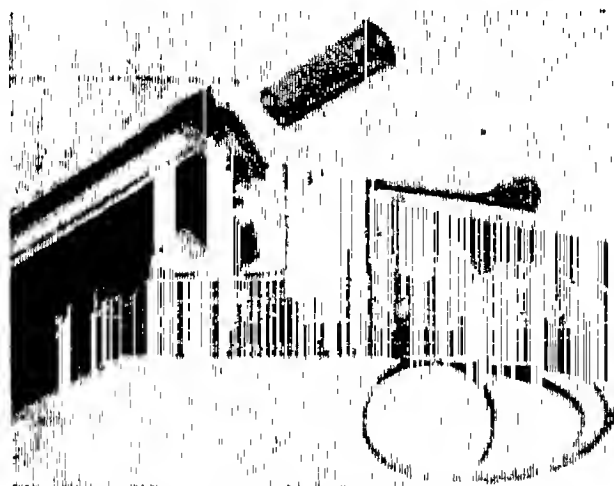
Bredon. Village of Worcestershire, England. Close to the river Avon and not far from the Gloucestershire border, it is 3 m. N. of Tewkesbury and has a rly. station. There are a Norman and Decorated church and a tithe-barn. Pop. (1951) 1,028. Bredon Hill (961 ft.) to the N. commands a famous view—the “coloured counties” of A. E. Housman’s poem *Bredon Hill*. Bredon was the site of a Roman-British settlement.

Breeches (Lat. *bracae*). Clothing for the lower part of the body and legs. Modern breeches reach to the knee only, and are mostly used for riding, but among Celtic and barbaric nations *bracae* were long, baggy garments gathered in at the ankle. In the 16th century the hose, which was another name for breeches, were separated from the latter. The shape of breeches ranges from the old baggy trousers to the tight garments puffed at the top of the time of Henry VIII, and from the petticoat breeches of the Stuarts to the tight knee breeches worn in the reign of William III, and still used in court dress.

Breeches Buoy. Device for rescuing persons from ships wrecked off shore. A breeches buoy consists of a pair of short-

legged canvas breeches suspended by the waist from a circular life-buoy of cork. It is attached by short ropes to a block which runs upon a hawser stretched from ship to shore and is drawn to land by hauling lines. The person to be rescued sits in the buoy with his legs projecting through the holes in the breeches. When it is necessary to link ship with shore by breeches buoy, a light line is fired by rocket to the ship and the main hawser is then hauled aboard and secured. Weather permitting, a breeches buoy can be used in mid-ocean to transfer a person from one ship to another.

Breechloader. Firearm that can be loaded at the breech instead of at the muzzle. Breech loading

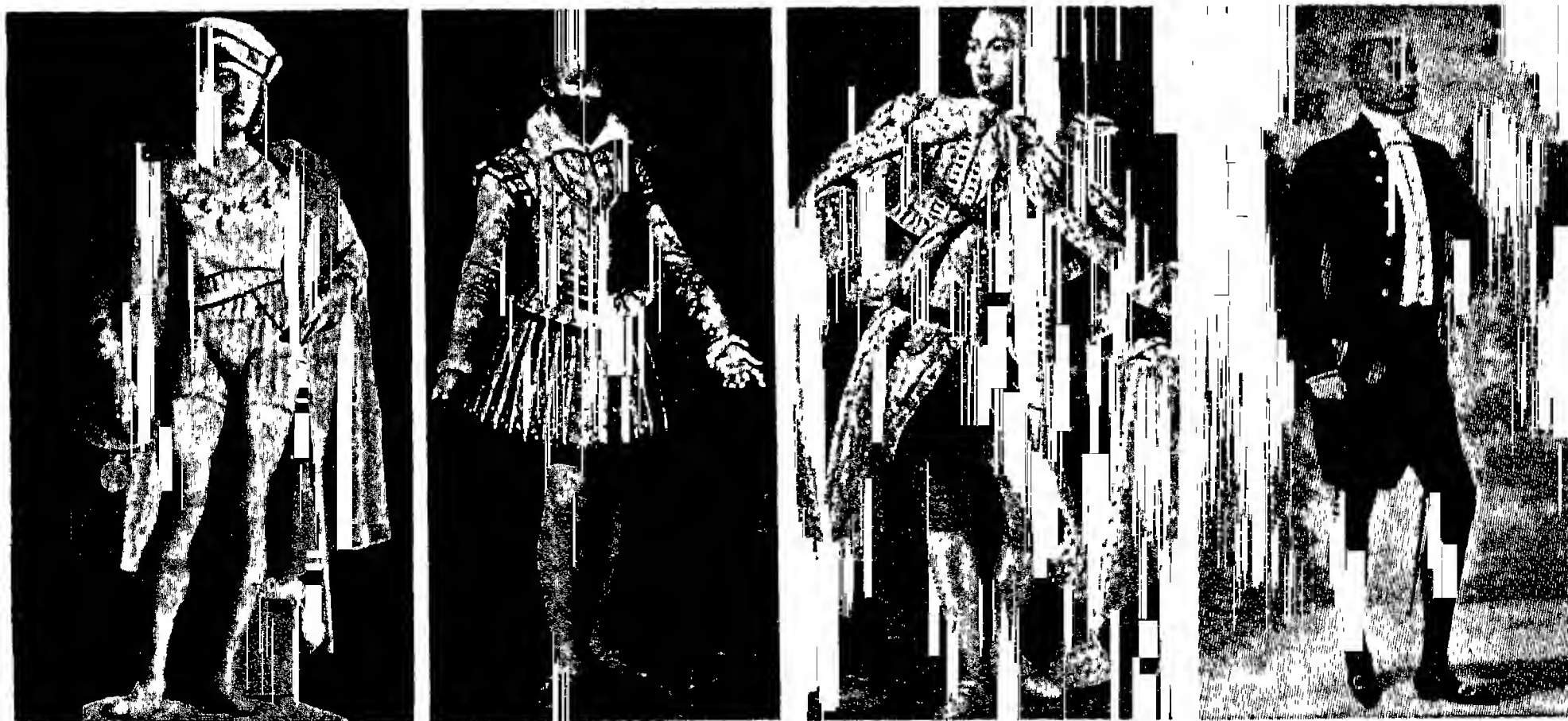


Breechloader. Double-barrelled shot-gun with cartridge ejector

was a development consequent upon the rifling of barrels. The first practical breechloading rifle was invented by an American named Hall in 1811; the chamber rose on a hinge for loading. In 1812, Captain Pauly, one of Napoleon’s officers, evolved a breechloader with a swinging block. Both these early firearms suffered from the defect that there

was no efficient method of sealing the breech, so that when the rifle was fired a large proportion of the gases generated by the discharge flashed back to the firer. It was not until 1841, when Dreyse invented his breechloading needle gun using rimmed cartridges, that the breechloader became a practical proposition. By 1866 breechloading rifles using a bolt containing the firing pin, and sliding axially with the bore, had come into general use. In 1870 the French and German armies fought with breechloading needle or firing-pin rifles; the French using the Chassepot and the Germans the Snider. All modern breechloading rifles are refinements of one or the other.

The earliest example of a breechloading smooth-bore gun is the arquebus made for Henry VIII in 1537 and now in the Tower of London. No further progress was made until 1836, when Casimer Lefauchaux, a French gunsmith, invented a double-barrelled breechloading shot-gun. Although a crude weapon in many respects, it utilised the modern shot-gun principle of having the barrels tip downward from a hinge near the breech. Lefauchaux also invented a pin-fire paper cartridge which at the instant of its discharge expanded at the base and sealed the breech. Later types of breechloader shot-gun were the Bastin action, in which the barrels were actuated by a lever and swung forward and backward on the front of the stock; the turnover breech, in which the barrels revolved to the right on a pinion to admit the cartridge; and the side



Breeches as worn in different periods. Left to right : French, 15th century ; French, 16th century ; British, 18th century ; British, court dress, 20th century

motion, in which the barrels were swung vertically under the breech action. The top-lever action for locking and unlocking the barrels introduced in 1860 became standard on almost all breechloading shotguns.

Breede. River of Cape of Good Hope province, S. Africa. Rising in the Warm Bokkeveld, it passes through fine mountain scenery near Ceres, receives the waters of the Hex river, and enters the sea at Port Beaufort, St. Sebastian Bay. The last few miles are navigable.

Breeding OF ANIMALS AND PLANTS. Rearing and propagating animals and plants in such a way as to improve their quality. Some such process must have begun as soon as primitive man domesticated his first animals and planted his first crops: those animals or plants which excelled in desirable traits would be more highly valued and hence more likely to be preserved to propagate their kind. At a later stage breeding became a deliberate process, and eventually developed into a craft. The evolution during the 20th century of scientific theories of heredity (*see* Genetics) has led to some extent to the transformation of breeding from a craft into a science.

ANIMALS. Until the middle of the 18th century, livestock everywhere was of poor quality, and no definite breeds existed. The rise of animal breeding was stimulated and made possible by the agricultural revolution in the Great Britain of that period. With enclosure of the land the identity of a herd or flock could be preserved, and uncontrolled crossing prevented; while the great increase in supplies of animal fodder gave the necessary basis on which to build breeds of high productivity. One generation of British breeders was able to double or treble the productivity of livestock and to originate breeds of which the descendants stock large areas of the world today. Particular mention in this connexion is due to Robert Bakewell (1725-1795) who created the Leicester breed of sheep; John Ellman (1753-1832), the creator of the Southdown breed of sheep; and Charles Colling (1751-1836) who founded the Shorthorn breed of cattle.

The aim of the breeder is to change the hereditary constitution of his animals or plants so that they shall regularly manifest certain desirable qualities under

given conditions of management or cultivation. Thus until abundant pastures are available it is not possible to create a high-yielding breed of dairy cattle, since more milk cannot be got out of a cow than has been put into it in the form of fodder. Conversely, high-yielding dairy cattle are useless in the absence of appropriate environmental conditions: British shorthorns waste and sicken when transported to tropical conditions under which the unimproved local cattle thrive.

The Breeder's Task

Once the breeder has a clear picture of the type of animal or plant he wants, the purposes for which he wants it, and the conditions to which it must be adapted, his task falls into three parts: to introduce heritable variations; to foster the desirable variations and eliminate the undesirable ones until he attains the type at which he is aiming; to fix the desired type so that it breeds true.

The material with which the breeder starts may already contain sufficient heritable variability for his purpose. If the stock shows little tendency to vary, and is far removed from the desired type, heritable novelty is usually introduced by crossing.

The main object may be to introduce specific variations: for example, to combine together in one breed a number of characters already fully developed in two or three different breeds. The simplest instance of this is the transference from one breed to another of a Mendelian dominant character (*e.g.* absence of horns in cattle) by repeated back-crossing. The main object, on the other hand, may be a non-specific increase in the general level of variability as a basis for the subsequent selection of those variations which chance to be favourable. For this purpose the crossing of more distantly related forms is a usual practice, since this is followed by a greater release of variability.

There are some circumstances in which the first generation only of a cross is of economic value, either because further generations cannot be bred (*e.g.* the mule, which is sterile) or because the quality declines steeply in subsequent generations (*e.g.* hybrid corn). But generally the breeder's main activity consists in guiding his material in the desired direction by the selection in each generation of the most favourable

variant forms. "Mass selection" is the simplest way whereby the parents of the next generation are chosen on the basis of their own performance only. This leads to difficulties over qualities which are manifested in one sex only: a bull cannot be directly assessed for milking capacity or a cock for egg production. Attempts are therefore commonly made to judge by other qualities, for instance the so-called "show points" of a bull which are believed to be correlated with its capacity to transmit the desired quality to its daughters. The evidence that such correlations exist is slender, and harm has been done through exaggerated attention to show points.

A second method of selection, often used to reinforce the first, is to judge by pedigree. Pedigree is a valuable guide provided that undue attention is not paid to outstanding individuals in the remote ancestry. It is the immediate ancestors, primarily the parents, which make the greatest hereditary contribution.

Examination of Progeny

But the best guide to the transmitting power of an individual is to see what it actually transmits, *i.e.* to examine a sample of the progeny before accepting or rejecting the individual for further breeding. Progeny testing is much used, particularly in livestock breeding where artificial insemination allows a large sample of progeny to be raised and assessed while the animal under test is still at the beginning of its reproductive life.

Having established a breed or variety exhibiting in some of its members all the desired qualities, the next task is to fix these qualities in the breed, *i.e.* all the members of the breed must manifest these qualities uniformly, and breed true for them in succeeding generations. Continued selection itself tends towards this result through repeated elimination of unwanted genetic variation. Some degree of inbreeding is also necessary, if only to the extent of not crossing outside the breed. Rigorous inbreeding involving the mating together of close relatives is often used. The 18th-century pioneers of British animal breeding encountered much opposition on moral and religious grounds to the incest involved in their line-breeding procedures.

Once fixed, a superior breed of animals can rapidly be propagated

by using pedigree sires on successive generations of an inferior herd. In this way a large herd can be "graded up" in five or six generations virtually to the level of quality and uniformity of the pedigree breed.

PLANTS. An early landmark in the history of plant breeding was the publication in 1694 of Camerer's *De Sexu Plantarum Epistola* (letter concerning the sex of plants). The recognition of sex in plants made possible for the first time the deliberate creation of new forms by crossing; but advantage was not taken of the discovery until 1719 when Fairchild artificially crossed sweet william (*Dianthus barbatus*) and carnation (*Dianthus caryophyllus*). This was followed by a spate of work on hybridisation and selection by many European experimenters: in horticultural plants by Kolreuter (1733–1806), Knight (1759–1838), Gärtner (1722–1850), and Mendel (1822–84) whose paper on crosses in the garden pea profoundly influenced the growth of genetics in the 20th century; in cereals by Sherriiff (1789–1847), Louis de Vilmorin (1816–60) and his son Henri de Vilmorin (1843–1899). In habitually self-fertilising species of plants, close and continued inbreeding has given excellent results. The de Vilmorin wheats originated from single plants and remained vigorous and true to type after almost a century of self-fertilisation. In other organisms inbreeding should be used with caution, for it is often associated with a decline in economic qualities of growth rate, resistance to disease and adverse conditions, fertility etc. It also sometimes results in a loss of uniformity in outward qualities, owing to increased sensitivity to environmental causes of variation.

Species hybrids in plants can sometimes be rendered fertile and true-breeding by artificial doubling of the chromosome number (see Polyploidy). Fixation presents no problems in those plants which can be propagated by non-sexual means (e.g. by rooting or grafting cuttings, layering, dividing tubers). This is because breeding true is the rule in vegetative reproduction. In the few exceptions known, the causes are obscure.

HYBRID VIGOUR. Decline in vigour sometimes accompanies inbreeding: conversely, increased vigour often results from wide crossing. The mule, a cross between different species, exhibits sufficient additional strength and

hardiness to outweigh the drawback of sterility. Outstanding meat qualities make some sterile duck hybrids highly valuable commercially. Crosses between breeds within a species sometimes give excellent results, e.g. the popular Blackface–Border Leicester combination in English sheep farming.

These examples have been chosen because they appear to involve more than the simple restoration by crossing of vigour lost in prior inbreeding. Such simple restoration has been the basis of a very successful method of maize breeding in the U.S.A. Inbred lines of maize are produced on a large scale by self-fertilisation for the sole purpose of producing vigorous and uniform hybrid corn by crossing. In some combinations greater yields are obtained than in the original outbred varieties, probably owing to the purging by the inbreeding process of harmful recessive factors. But it is not clear that the gain outweighs the cost and effort of producing and maintaining the inbred lines, as compared with the results of crossing between different outbred varieties.

In most western countries much genetical research has been devoted to questions of theoretical biology; the results have done more to provide the breeder with explanations of what he is already doing than to introduce new procedures. But important contributions have been made in instances where economically valuable characters segregate as single Mendelian factors. In plants the characters differentiating popcorn from sweet corn and nectarines from peaches are examples, as also are some types of disease-resistance in cereals and floral characters in ornamental plants. In animals examples are the polled (hornless) character in cattle and the short legs of the Ancon breed of sheep.

The variation of most economic characters is determined by the joint action of a large number of genetic and environmental factors. Attempts have been made to develop a Mendelian calculus of multifactorial inheritance, and thereby to derive rules and criteria on which to base selection. This method requires the assumption that the genetic units act additively on the development of the character in independence of each other and of variations in the environment. The extent to which this assumption holds in practice is not clear, but it is known in some instances to be seriously in error. On the other hand the emphasis

laid by Mendelian genetics on the distinction between outward qualities (phenotype) and underlying genetic constitution (genotype) has been of great value in promoting the spread of progeny-testing in stockbreeding.

In contrast to western geneticists, Russian geneticists of the school founded by the plant-breeder Michurin (1855–1935) put more emphasis on application to practice than on fundamental theory. Their precepts, as enforced by T. D. Lysenko in the years following the Second Great War, were not so much innovations as revivals of ideas current among 19th-century British breeders, particularly the belief that the direct action of environmental conditions can influence the hereditary constitution. Working from this basis Michurin and his followers claimed that they had added many practical aids to scientific breeding. Consult Mendel's *Principles of Heredity*, W. Bateson, 1913; *The Evolution of Genetic Systems*, C. D. Darlington, 1939; *The Science of Animal Breeding in Britain*, F. H. A. and J. Marshall, 1947; *Agrobiology*, T. D. Lysenko, Eng. trans., 1954; *Breeding Cows for Milk*, A. L. Hewitt, 1955.

Breeze Block. Concrete building slab made from three parts of furnace ash, one part of sand, and one part of Portland cement. The blocks are cheap and light, and are used for building interior walls and partitions. Clinker blocks are made from cement, sand, and cinders and other solid residue from furnaces.

Bregenz. Town of Austria, capital of the prov. of Vorarlberg. Situated at the E. end of Lake Constance, 6 m. S.E. of Lindau, it consists of the old town on a hill and the new town in the plain below. The church of S. Gall has an old tower, and the museum contains Roman antiquities. There is trade in grain, cattle, and cotton and silk goods. The Brigantium of the Romans, Bregenz was long the seat of a countship, which passed in the 16th century to the Hapsburgs. Pop. (1951) 20,277.

Brehon Laws. Ancient legal system which prevailed in Ireland for more than 1,000 years before the 17th century. The word brehon is an Anglo-Irish form of the Gaelic brithem and means a judge. Six volumes published, 1865–1901, under the title *Ancient Laws of Ireland*, contained translations of MSS., dating from the 8th to the 13th century. The largest and most valuable of these MSS. is the *Senchus Mor* (Great Book of Old

Law), which, though incomplete, fills more than two volumes in the translations. Historical evidence traces this back to the 5th century, while another document, the Book of Aieill, belongs partly to the 3rd and partly to the 7th century.

The laws cover a wide field, and from them a faithful picture of social life and custom in Ireland for a long period of time may be drawn. The tribe or clan (*fine*) is the unit, and at the assemblies of the tribes the laws were proclaimed. A proportion of the land was under private ownership; the rest belonged to the tribe and was held in common. Society was graded from the supreme king of Erin, through provincial kings, nobles, tribal chiefs, and clansmen to serfs. The education and foster care of the children, crime, including murder, and contracts relating to property are all dealt with at length. Reparation for injury is the governing principle, and revenge and retaliation are discountenanced.

Breisach OR ALT BREISACH. Town of W. Germany, in the *Land* of Baden-Württemberg. It is on the right or eastern bank of the Rhine, 14 m. W.N.W. of Freiburg on the rly. to Colmar. Its interest is mainly historical, and due to its position on the river, but it has a trade in wine, corn, etc. The chief building is the minster, an imposing but irregular structure, richly decorated within. Across the Rhine is Neu Breisach.

Breisach was a strong fortress and was frequently besieged. Called Mons Brisiacus, it was a stronghold of the Gauls and later a Roman fortress. In the Middle Ages it was a free city of Germany, one of the main defences of the kingdom. It was taken from the emperor during the Thirty Years' War. In 1648 it was given to France, to be restored to the emperor in 1697, when the French built Neu Breisach. It passed again to France and was again recovered by Germany during the 18th century. In 1796 the French took it, but by the settlement of 1815 Baden, to which it had belonged since 1805, was confirmed in its possession.

Breisgau (Ger. *gau*, district). District of Baden-Württemberg, W. Germany. It stretches along the E. side of the Rhine from Basel to Kehl, and contains the southern part of the Black Forest. Freiburg is its chief town. As a county it was ruled in the Middle Ages by various families, and later passed in part to the Hapsburgs. The

French overran it more than once, but it remained German, and in 1805 was divided between Baden and Württemberg. In 1810 Baden secured the whole district.

Breitenfeld, BATTLE OF. Fought Sept. 17 (N.S.), 1631, between the Swedes and their Saxon allies under Gustavus Adolphus and the Imperialists under Tilly. The aim of Gustavus was to strengthen his army by alliances with Brandenburg and Saxony before he advanced southward to meet his foes. While he negotiated, Magdeburg, which he had undertaken to relieve, was sacked in May by Tilly's troops. In Sept., the elector of Saxony joined the king, and Gustavus immediately marched out to battle from his entrenched camp at Werben.

The battle took place near the village of Breitenfeld, about 6 m. from Leipzig. Each army formed a long line in traditional formation, infantry in the centre, cavalry on the wings, and artillery in front.

The fight began with an artillery duel followed by a charge of Tilly's horse, who, led by Pappenheim, bore round to the right flank of the Swedes. The men in the latter position turned to receive this blow, and after a savage encounter drove off their foes. At the other end of the field, however, the Saxons had been put to flight, and while they were being chased a decision was reached elsewhere. Tilly's infantry crashed into the exposed left flank of the Swedes, who turned to face them, and a desperate struggle followed. It was decided in favour of the Swedes, as the troops from their other wing, who had just routed Pappenheim's horsemen, occupied the positions vacated by the Imperialist foot, and turned their own guns upon them. Upon this the Imperialists began to fall back and were soon in full retreat.

The numbers were fairly equal, the Imperialists being about 32,000 strong and their enemies somewhat more. The losses were about 10,000 Imperialists killed and wounded, and 6,000 Swedes and Saxons. Many Imperialists were made prisoners, and Tilly's army, having lost all its guns, was practically routed and destroyed. He himself was wounded, but escaped.

Breithorn. Mountain peak of the Pennine Alps (*q.v.*). It is situated between the Matterhorn and Monte Rosa, S. of Zermatt, on the Italo-Swiss frontier. Height, 13,685 ft. On the N. flows the Gorner Glacier; from the S., that of Monte Rosa.

Breitkopf, JOHANN GOTTLÖB IMMANUEL (1719-94). A German printer. Born at Leipzig, Nov. 23, 1719, son of Bernhard Christoph Breitkopf (1695-1777), who founded a printing firm later called Breitkopf & Hartel, he invented music type in 1754, and was the author of treatises on map printing (1777), book printing (1779), and on the origins of playing-cards, linen paper, and woodcuts (1784-1801). He died Jan. 28, 1794.

Breitmann, HANS. Name by which Charles Godfrey Leland (*q.v.*) was known after the publication of his *Hans Breitmann's Ballads*.

Breitscheid, RUDOLF (1874-1945). German economist. Born at Cologne, Nov. 2, 1874, he was educated at Munich and Marburg universities, and was chairman of a democratic union, 1903-12. He voted against the war budget, 1917, and after the German revolution the following year he became first Prussian minister of the interior. A member of the Reichstag, 1920-33, he was the Socialist party's expert on foreign policy, close collaborator with Stresemann and a brilliant and fearless speaker. When Hitler assumed power he went into exile in France. He was given up to the Gestapo, Feb. 11, 1941, by the Vichy govt., and his death at Buchenwald was reported Sept. 15, 1945.

Bremen. Former independent and republican state within the German empire and the Weimar republic, now forming a *Land* of W. Germany. The state consisted of the city of Bremen and the detached territories of the ports of Bremerhaven and Vegesack, the first at the mouth of the river Weser, the second farther inland, on the right bank. Total area is 156 sq. m., pop. (est. 1955) 629,000. 85 p.c. of whom are Protestants. The large majority of this pop. is engaged in industry and trade, connected with Bremen's rôle as the second biggest port of Germany; in the rural communities fishing is the main occupation apart from some agriculture and cattle breeding.

Bremen was created a bishopric in 788, united with Hamburg by an archbishop in 845, emancipated from clerical rule in the 13th century. From 1260, it played an important part in the Hanseatic League until the league decayed in the 17th century. In 1522 the reformed religion was introduced into Bremen by Henry of Zutphen, who was burned through the influence of Archbishop Christoph of Brunswick (1487-1558):

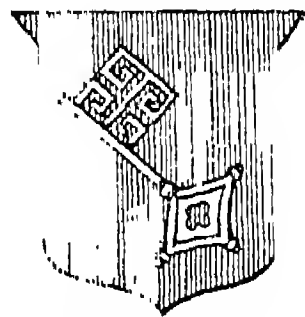
Protestantism became the state religion 618. In the Thirty Years' War Bremen fell into Swedish hands, though the city was in 1646 recognized as a free city. The citizens finally bought their independence from Sweden by the cession of their territories at the mouth of the Weser. This considerable area, over 2,000 sq. m. with the capital of Stade, was described as the duchy of Bremen and fell in 1715 to Hanover. Bremen city regained most of it in 1803, and was made by Napoleon capital of a French dept.

When, in 1815, the German confederation was founded, Bremen joined it as a sovereign free city, its old rank having been confirmed in 1741, and soon regained importance as a port and trading centre; especially so after developing Bremerhaven, which had to take the place of the obsolete river port. In 1857 the first big German transoceanic line, Norddeutscher Lloyd, was founded at Bremen. In 1867 the city transferred its military authority to Prussia, and in 1871 became a sovereign member of the federation embodied in

the new empire, but joined the customs union with Prussia and the other members only in 1888. Modernisation of the port made it once more possible for large vessels to go to Bremen itself, there helping to develop a great industry. After the First Great War Bremen came, for a period of nearly three months, under Communist rule and was eventually liberated by military action. From then, except when the Nazis installed a *Gauleiter*, Bremen has been ruled by a *Bürgerschaft* (citizens' diet) of 120 and a small senate of varying numbers. The chairman of the senate was also *Bürgermeister*.

In the Second Great War, Bremen and its ports suffered severely. After it, a U.S. enclave was set up surrounding Bremen, Bremerhaven, and Wesermünde; except for the actual ports, the enclave was transferred to British administration Dec. 10, 1945. The three ports, recognized by the U.S. authorities as a *Land* (state) within the U.S. zone Jan. 22, 1947, formed one of the *Länder* of the federal republic of West Germany proclaimed in 1949.

Bremen. German city and capital of the small *Land* of the same name. It occupies an



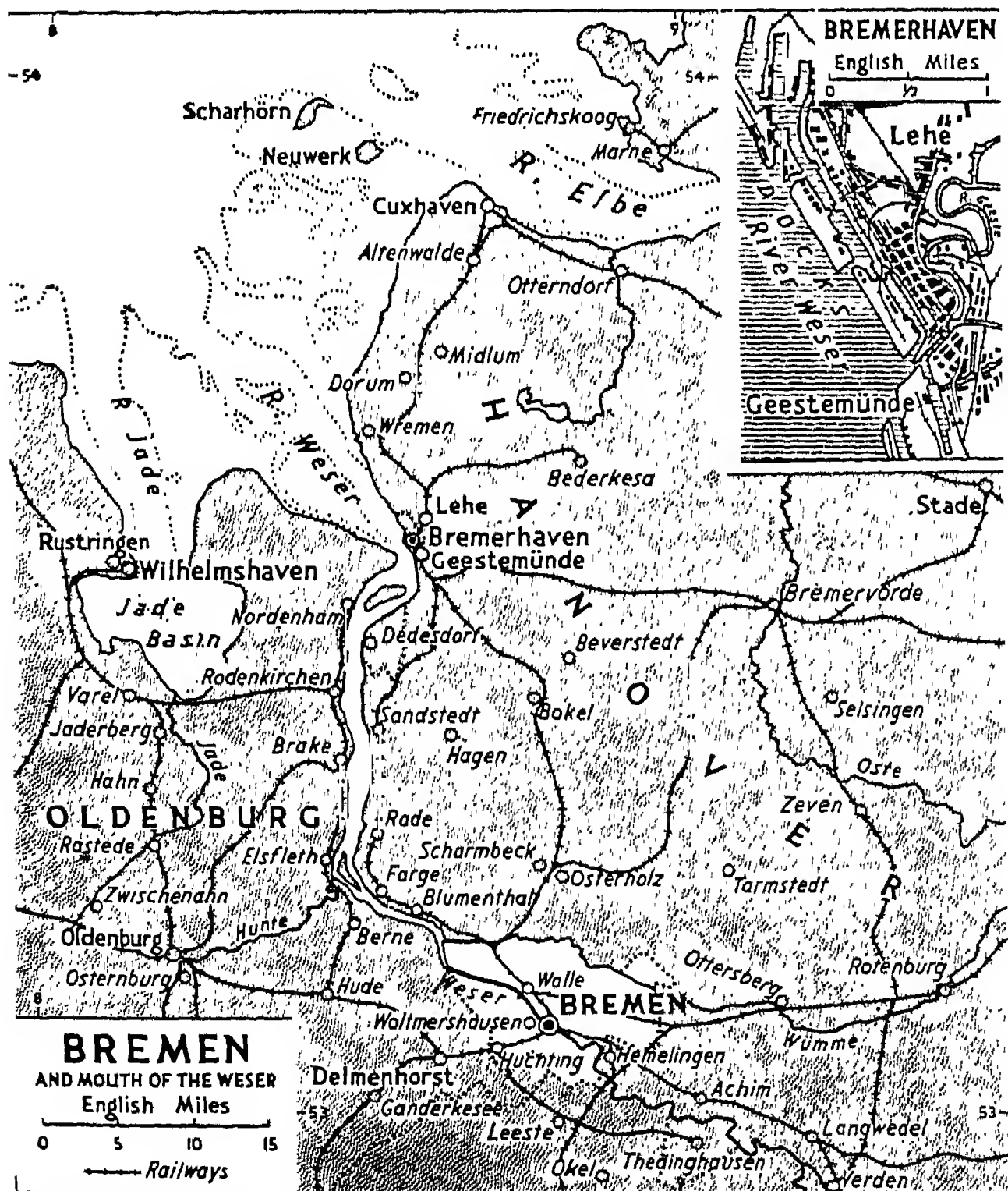
Bremen city arms

area of 33.5 sq. m. and had an est. pop. of 500,000 in 1955. It stands on both sides of the river Weser, about 46 m. from its mouth, and 77 m. by rly. S.W. of

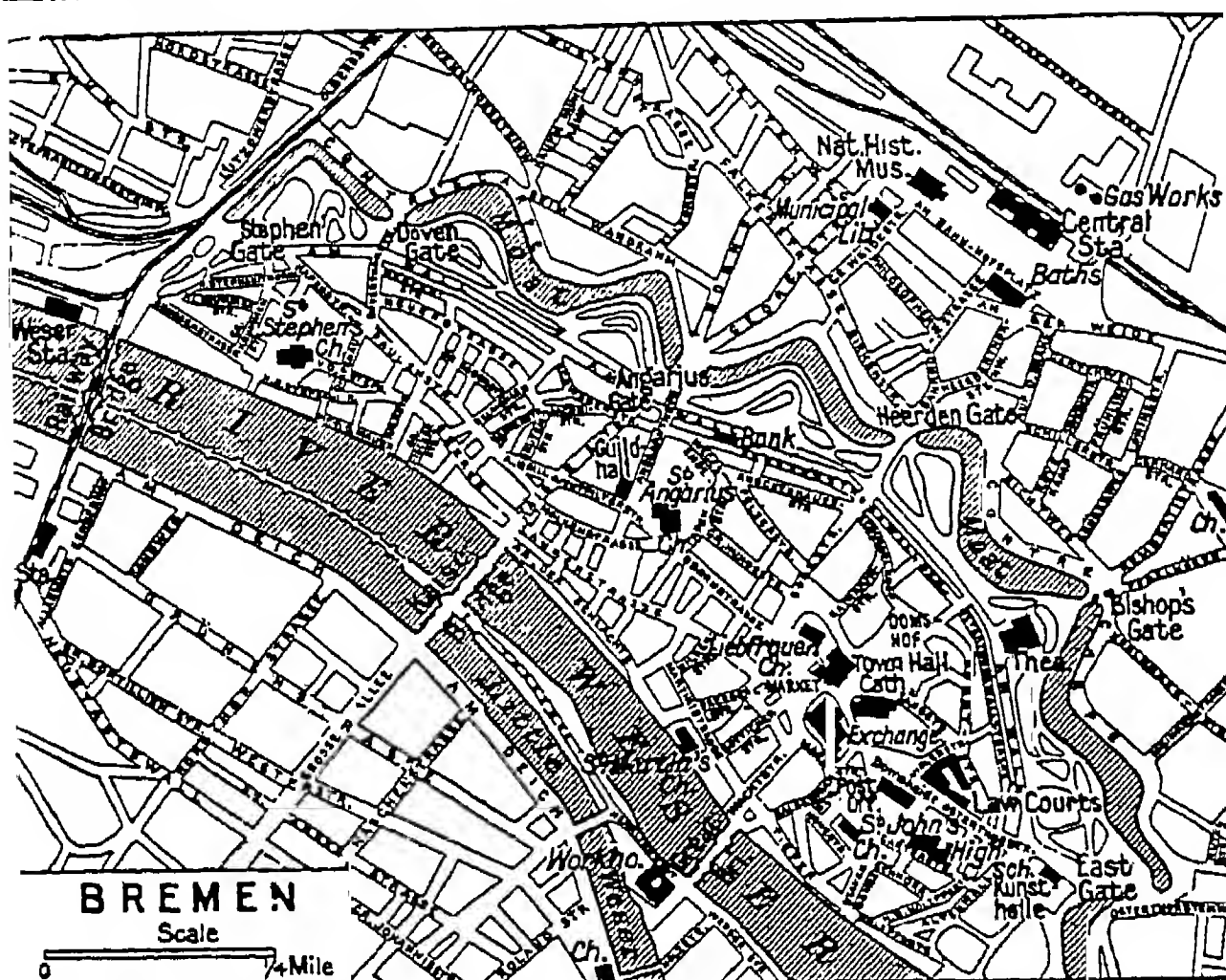
Hamburg, next to which Bremen is the biggest port of Germany. Average tonnage of incoming or outgoing ships was between 7 and 8 millions a year, and there was also a fluvial transport of between 2 and 2.5 million tons. Bremen has five large ports, reached by a modern fairway allowing for ships with a draught up to 24 ft.; the city consequently became one of the main trading centres, with an international market in wool, cotton, tobacco, petroleum, rice, corn, coffee, silk, and many industries deriving therefrom. Rice mills, woolcombing plants, cigar factories were prospering; and some of Germany's greatest shipyards, machine and automobile factories, breweries, chocolate factories, and grain mills were located there. Of the total German merchant fleet Bremen possessed about 28 p.c.; it dominated the trade with America, and reached annual turnovers of £250 millions.

The old city, now largely in ruins, was surrounded by a beautiful park created upon former fortifications, and contained in its centre a number of precious relics of medieval architecture and sculpture; the Rathaus (town hall), a Romanesque cathedral dating back to the 11th century; churches of S. Martin, S. Ansgarius, S. Stephen, S. John, and S. Mary, all built between the 12th and 14th centuries; and many public and private buildings in a particular, brick-Gothic gabled style. For the adaptation of necessary modern buildings to the old style, wealthy Bremen magnates had employed some of the finest modern architects, sculptors, and painters. An excellent art gallery testified to the wealth of the old city, which possessed a liberal-patrician spirit entirely its own, and, mainly because of it, had recovered from the heavy blows of the First Great War, and the conditions of the peace treaty which deprived Bremen of its ships, with an astonishing rapidity.

Bremen was one of Germany's principal shipbuilding and arma-



Bremen. Map of the state, showing the mouths of the rivers Weser and Elbe. Inset, plan of Bremerhaven, the seaport of Bremen



Bremen. Plan of the city, showing the old moated town on the right bank of the river Weser. The new town is on the left bank

ment centres in the Second Great War. It was very heavily defended, but its docks, arms works, and rly. yards were constantly raided throughout the war, more than 200 separate attacks being made by Allied aircraft. In the early part of April, 1945, Montgomery's British 2nd army carried out one of his characteristic "hook" movements, isolating Bremen, assault on which began at midnight of April 23-24. Fierce street fighting, including the use of flame-throwers, brought surrender of the city on April 26, of the docks at dawn on the 27th. Sixteen large U-boats (15 ready for launching) and a large destroyer were found in the shipbuilding yards. By 1956 the harbour had been restored and much of the town had been rebuilt.

Bremen. German liner built for the Norddeutscher Lloyd. The Bremen's keel was laid June, 1927, and she was launched Aug., 1928. Displacing 51,650 tons on a length of 938 ft. 8 ins., a beam of 101 ft. 8½ ins., and a draught of 33 ft. 7½ ins., she was powered by four sets of geared turbines which developed a shaft h.p. of 84,000 to give the ship an average speed of 26 knots. Manned by a crew of 960, she had accommodation for 2,147 passengers.

In July, 1929, the Bremen left on her maiden voyage and crossed from Cherbourg to New York in 4 days 17 hrs. 42 mins. at an average speed of 27.83 knots, thus beating the *Mauretania's* fastest crossing and setting up a new record to gain for a time the Blue Riband (*q.v.*) of the Atlantic. She

made her last Atlantic crossing just before the outbreak of the Second Great War. She left New York on Aug. 30, 1939, succeeded in passing N. of Iceland, and reached Murmansk. On Dec. 12, 1940, she managed to reach Bremerhaven, heavily escorted by destroyers. The British submarine *Salmon* sighted her, but by international law could not torpedo her without warning. The Germans announced March 17, 1941, that fire had broken out on board her. S.H.A.E.F. found her a total loss when examined, May 15, 1945.

Bremen Blue. Greenish-blue pigment, chiefly copper hydroxide associated with copper carbonate. Blue verditer is a copper blue similar to Bremen blue.

Bremer, FREDRIKA (1801-65). Swedish novelist. Born at Tuorla, near Abo (Turku), Finland, Aug. 17, 1801, the daughter of a wealthy ironfounder, she was brought up in Sweden. Of her *Sketches of Every-day Life* (1828-48), the first volume, *Axel and Anna*, appeared in 1828, the second, *The H. Family*, in 1830. The latter established her reputation, enhanced by succeeding volumes. Her later books, *Hertha* (1856) and *Father and Daughter* (1858), advocated the emancipation of women. She died Dec. 31, 1865.

Bremerhaven. Seaport of Germany, the harbour or out-port of Bremen. Standing at the junction of the Weser and the Geeste, about 40 m. N. of Bremen, it has churches, a museum, and a technical school. The idea of the port originated with a burgomaster of Bremen

about 1826, the works being erected and opened in 1830. The large and safe harbour with its eight lighthouses, contains all the latest appliances for loading and unloading ships; it has also 112 acres of wet docks and several dry docks. The town is a shipbuilding centre, and was one of the bases of the German fleet. E. and S. of Bremerhaven lies Wesermünde, created 1924 by the amalgamation of the towns of Lehe and Geestemünde. During the Second Great War Bremen's naval and shipbuilding yards and its aircraft factories were repeatedly bombed by the R.A.F. and U.S.A.A.F. In 1945 it came under Allied control. Pop. (est. 1955) 129,000.

Brendan (484-577). Irish saint. Born near Tralee, county Kerry, and ordained priest 512, he established monasteries at Ardfert and at the foot of the Brandon Hill. About 550 he went on missionary journeys to Wales and Iona and returning to Ireland founded the see of Ardfert, churches in Galway and co. Mayo, and the religious house of Clonfert, where he is buried. His festival is May 16.

Brendon Hills. Limestone range in the W. of Somerset, England. They lie about 6 m. S. of Watchet and reach 1,391 ft.

Bren Gun. Weapon originally designed and manufactured at Brno (Brünn) by the Skoda armament works. It takes its name from the city of Brno in Czechoslovakia. It was adopted as the standard automatic weapon for British infantry in 1936. Simple to use and extremely accurate, the Bren gun is gas-operated: gas from the first explosion fires the second round, and so on. The gun is 45 ins. long, weighs 21 lb., and has a potential rate of fire of 500 rounds per min. (rifle calibre). It is fed by magazines each holding 30 rounds, and the rate of fire, allowing for changing of magazines, is 120 r.p.m. It has an effective range of 2,000 yds.

The gun can be regulated to fire either single or multiple shots, and can be mounted on a tripod or bipod, or fired direct from the hip or shoulder. Generally speaking the weapon proved unsuitable for A.A. work, as it has practically no cone of fire, i.e. the bullets from a burst of Bren gun fire do not spray, but strike the same point on the target. See *Machine-Gun*.

Brennan, Louis (1852-1932). British inventor. Born at Castlebar, co. Mayo, Jan. 28, 1852, he

passed much of his early life in Australia. His fame rests upon his inventions of the Brennan torpedo and of the gyroscopic monorail system of transport. During 1887-96 he was superintendent of a government factory where his torpedoes were made, and during 1896-1907 its consulting engineer. He was later engaged in research for the Air Ministry. He died Jan 17, 1932.

Brenner. Village of Austria. Situated in Tirol on the Italian boundary, and near the head of the Brenner Pass, it has hot springs, and is a summer resort.

Brenner Pass. Lowest pass over the Alps. On the Italo-Austrian boundary, between Innsbruck and Bolzano, it has been a carriage-road since 1772, and is traversed by a rly. passing over many bridges and viaducts and through several tunnels, opened in 1867. The pass, 4,500 ft. high, was used by the Romans.

Hitler and Mussolini held three of their meetings during the Second Great War at the Brenner Pass, on March 18 and Oct. 14, 1940, and on June 2, 1941. As a vital link in the German-Italian lines of communication the railway and its bridges and viaducts were a constant target for Allied bombers, and during the campaign in Italy the line was more than once put out of action. Troops of the Allied 5th Army, which had fought its way up Italy, and troops of the U.S. 7th army from N. Europe met near the pass May 4, 1945.

Brennus. Leader of the Gauls. He invaded Italy, defeated the Romans at the battle of the Allia, 390 B.C., and captured Rome except the Capitol, on which occasion he is said to have used the phrase *Vae victis* (woe to the conquered!). Another Brennus, also a Gallic chief, invaded Macedonia 280 B.C. and penetrated into Greece, but was defeated at Delphi. Brennus is probably not a proper name, but a title, like the Etruscan Lars, and identical with the Celtic word *brennin*, meaning king.

Brenta. River of Italy. Anciently known as the Medoacus and Moduacus Major, it issues from Lake Caldonazzo, in the Trentino, S.E. of Trent, passes E. through the mts. by the Val Sugana, turns S. near Tezze, forms an E. bend about Cismon, and curves W. about Valstagna. Thence it passes S. to Bassano, where it enters the Venetian plain, and empties by three arms into the N.W. Adriatic, after a course of 106 m., the lower half of

which is navigable. Its northernmost arm reaches the sea at Fusina, immediately S. of Venice; farther S. its other arms extend into the lagoon of Venice, near Chioggia. From Bassano it is contained by dykes, and E. of Padua it is canalised to the coast. Along its left bank a rly. and high road run to Bassano from Trent.

Brenta, BATTLE OF THE. Term sometimes applied to the fighting which took place during the First Great War on the Italian front in Nov.-Dec., 1917, in the valley of the Brenta and its neighbourhood. See Asiago Plateau.

Brentano, CLEMENS (1778-1842). German poet, novelist, and playwright, the most gifted and versatile of the German Romantic writers. Born at Ehrenbreitstein, Sept. 8, 1778, he led an unsettled life, going to Heidelberg in 1805, where he was joined by the writer Ludwig Achim von Arnim (1781-1831). Round them grew up the Heidelberg school of Romantic poets, and the two men collaborated to publish *Des Knaben Wunderhorn* (the boy's magic horn), 1806-08, a collection of folk-songs, which was one of the achievements of German Romanticism.

Brentano's writing was often marred by over-fantastic imagery, but sometimes he produced work of great charm, as in *Die Geschichte vom braven Kasperl und dem schönen Annerl* (the tale of worthy Kasperl and lovely Annerl), written 1816-17. He became a Roman Catholic in 1818, and from this date his only work was recording and interpreting the visions of a nun, Anna Katherina Emmerich. He died at Aschaffenburg, July 28, 1842.

Brentano's sister Bettina or Elisabeth (1785-1859) married his friend Achim von Arnim in 1811. In 1835 she published *Goethes Briefwechsel mit einem Kinde* (Goethe's correspondence with a child), partly fictional, partly based on her romantic attachment to Goethe, whom she met in 1807.

Brentano, LUDWIG JOSEPH (LUJO) (1844-1931). German economist. A nephew of the poets Clemens Brentano and Bettina von Arnim, he was born at Aschaffenburg, Dec. 18, 1844. Owing to his early acquaintance with British industrial and trade union conditions, he became one of the greatest authorities upon the science of economics, and was an active champion of the working classes. As a professor at Berlin, Breslau, Vienna, Leipzig, and finally at Munich, 1891-1914, he

upheld his liberal principles. His *Labour's Wage and Hours in their relation to Labour's Production*, 1876, remains a classic. An *Economic History of Britain*, 1927, was a notable publication. He died at Munich, Sept., 9 1931.

Brentford, WILLIAM JOYNSON-HICKS, 1ST VISCOUNT (1865-1932). British politician. William Hicks, born June 23, 1865, became a solicitor, 1888. On his marriage, 1895, he added his wife's surname, Joynson, to his own. Conservative M.P. for N.W. Manchester, 1908-10, Brent-



Viscount Brentford, British politician

ford, 1911-18, and Twickenham, 1918-29, he was created a baronet, 1919. He was parliamentary secretary, Overseas Trade department, 1922; then postmaster-general, financial secretary to the treasury, with a seat in the cabinet, and minister of health. In 1924 he was made home secretary, and, popularly known as Jix, was constantly in the public eye. A prominent member of the Evangelical section in the Church of England, he took a leading part in parliament in defeating the proposals for a reformed prayer book in 1927. He left office, 1929, and was made a viscount. On his death, June 8, 1932, the title passed to his eldest son, Richard Cecil Joynson-Hicks (b. 1896). Consult Jix, Viscount Brentford, H. A. Taylor, 1933.

Brentford and Chiswick. Borough of Middlesex, England. It lies 7 m. W. of S. Paul's, London, on the left bank of the Thames. The main road to the W. passes through the borough, which is served by London Transport and British Railways, Southern Region. It forms a borough constituency. Pop. (1951) 59,367.



Brentford and Chiswick arms

Chiswick is mainly residential, with a few light industries, including the manufacture of polishes and cosmetics, and electrical engineering; Brentford's industrial belt fringes the Great West Road, where soaps, cosmetics, foods, and chemical engineering products are made. One-fifth of the borough is permanent open space that includes the riverside land, the grounds of the Palladian Chiswick

House, Boston Manor Park, and (Gunnersbury Park. S. Lawrence's church, Chiswick, has interesting 12th-century memorials. The church of S. Nicholas, Chiswick, rebuilt 1884, has a 15th-century tower; in the churchyard are the tombs of Hogarth and Whistler. Hogarth's house, in Hogarth Lane, is a museum.

Edmund Ironside defeated the Danes at Brentford in 1016; six martyrs were buried alive here in 1558; and in 1642 the Royalists scattered the Parliamentarians in a skirmish that ended in a Royalist defeat at Turnham Green.



Brent-goose

Brent-goose (*Branta bernicla*). Species of wild goose which visits the shores of Great Britain in autumn and winter, spending summer in the northern regions. It is blackish brown on the upper parts and grey below and weighs about 4 lb. Its flesh is valued for the table.

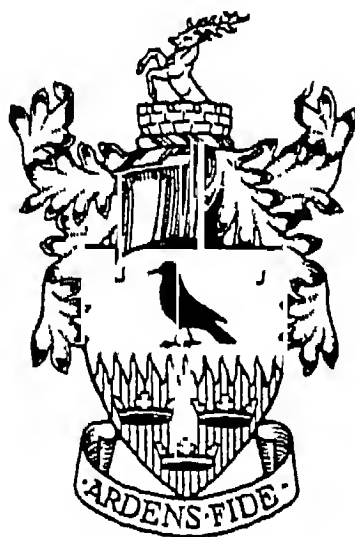
Brentwood. An urban district and town of Essex, England. Served by an electrified line of British Railways, Eastern Region, it is 18 m. N.E. of London and is primarily residential, but has some light industries. The urban district, extended in 1934, includes the town of Brentwood and parts of nine villages. Large tracts of parkland in the area have been acquired by the local authorities to form part of the "green belt" round Greater London.

Brentwood grammar school was founded in 1557. Pop. (1951) 29,897.

Brer Rabbit. Chief animal character in the American Negro folktales made familiar by Joel Chandler Harris in his book *Uncle Remus*. The frequent allusion to Brer Rabbit as "layin' low and sayin' nuthin'" is based on a misquotation. The phrase in the story of Brer Rabbit and the Tar-Baby is "Tar-Baby, she ain't sayin' nuthin', and Brer Fox, he lay low."

Brescia (anc. Brixia). City of Italy, capital of the prov. of Brescia. Beautifully situated at the foot of the Alps, it is an important rly. junction 51 m. E. of Milan. Dominated by its old castle, now a prison, and enclosed by walls, it has Roman remains. The old cathedral, probably of the 10th century, was built over a Christian basilica; the present cathedral is modern (1604 and 1825). The magnificent town hall, 1492-1574, is the work of Sansovino and Palladio. The massive Broletto, originally the council hall, now the law courts, dates from 1187 and 1222. There are many fine churches, some having good paintings by Tintoretto, Paolo Veronese, Moretto, and Romanino, but

most of these were amongst the many historic buildings to sustain damage (some being almost entirely destroyed) through bombing in the Second Great War. Important manufactures are iron and steel goods (including weapons and firearms—for which Brescia has been famous for centuries); wine, woollens, linen, and silk. Pop. (1951) 146,532.



Brentwood arms

A town of the Cenomani, Brescia became a Roman colony in 225 B.C. In A.D. 452 it was sacked by Attila. In the latter part of the 12th century it figured prominently in the Lombard League, and after being pillaged and destroyed by the French in 1512 was attached to Venice until 1797. In that year it was occupied by the Austrians, from whom it fell to Piedmont in 1859. In 1849 the town acquired a high place in the annals of the Risorgimento by its heroic rising (March 23-April 1) against overwhelming Austrian forces.

The province of Brescia covers part of the main range of the Alps (where timber is the chief product) and stretches down to the lower hills (the vine, the olive, and other



Brescia. The old and new cathedrals of this Italian city



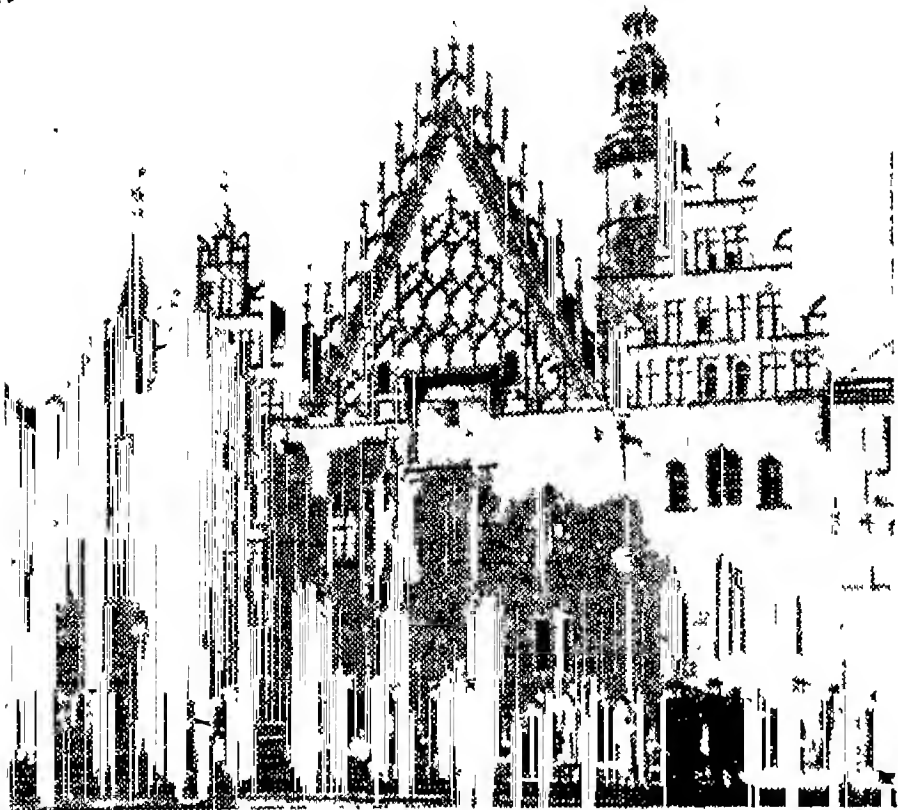
Brescia. The Piazza della Loggia with, in the foreground, the two iron figures and bell on the clock tower, dating from 1552

fruit trees) and to the plain (wheat). Pop. (1951) 842,145. *Pron.* (approx.) braysh'ya.

Breslau (Pol. Wroclaw). German name of a city of eastern Europe on the Oder, 350 m. S.E. of its mouth. It was the capital of Silesia, and its size and importance are due to its position on the Oder, which is navigable from here, and to the rich coal and iron mines in the vicinity. The old town is on the left bank of the river. On the right bank and around the old town are modern suburbs.

The city grew up round the cathedral (begun in the 12th century, completed in the 15th, enlarged in the 17th and 18th, and restored in the 19th); and after having been for a time Polish, became in 1163 the chief town of an independent duchy. It passed in 1335 to the king of Bohemia. During 1480-90 included in Hungary, it was in 1742 taken by Frederick the Great, becoming part of Prussia until that state was abolished in 1945. It then came under Polish administration, the German population being expelled. Pop. (est. 1955) 374,000.

Breslau, formerly a great railway centre, is connected by canals with the Elbe and the Vistula, and as part of Prussia had an extensive



Breslau. The 14th-century Rathaus, turned after the Second Great War into a museum

trade in coal, timber, cereals, etc. Its manufactures included rly. stock, machinery, and iron goods of various kinds, furniture, carpets, paper, beer, and glass.

Breslau's many old buildings included, besides the cathedral, the Protestant church of S. Mary Magdalene, built in the 14th century, a miniature of the cathedral; the church of the Holy Cross and the 14th-century church of the Minorites; the 14th-century Rathaus, restored in the 19th century, underneath which was the Schweidnitzer Keller, used from about 1350 as a beer house. The fortifications, taken down after 1807, were replaced by promenades. The Hohenzollerns had a modern palace here. The university, established in 1811 with fine buildings facing the Oder, developed from a Jesuit college founded in 1702.

A frequent target for R.A.F. and Russian bombers during the Second Great War, Breslau was invested by the Russians on Feb. 14, 1945, during Marshal Koniev's rapid advance on Berlin, and fell May 7. It recovered very slowly from the destruction it suffered during the war, but by 1955 some of its historic buildings, *e.g.* the cathedral and the town hall, had been restored.

Breslau. German cruiser of the First Great War. With the Goeben (*q.v.*) she escaped the Allied fleets in the Strait of Messina, Aug., 1914, and took refuge in Turkish waters. Purchased by Turkey, the Goeben and the Breslau came out of the Dardanelles, Jan. 20, 1918, and attacked British ships north of Imbros, sinking a couple of small vessels. While heading back for the Dardanelles, the Breslau ran into a British minefield and sank;

172 of her crew were picked up and taken prisoner.

Bressanone (Ger. Brixen). Town of Bolzano prov., Italy. At the confluence of the Isarco and the Rienza, 24 m. by rly. N.E. of Bolzano, it has been the seat of a bishopric since the 4th century. It has a 15th-century cathedral rebuilt in the 18th century, and a fine episcopal palace. With its mixture of German and Italian styles, architecturally Bres-

sanone is, next to Bolzano, the most representative centre of Alto Adige. Bressanone was the scene of the first outbreak of the peasants' revolt, 1525. Artistically woven woollen articles, wine, fruit, and grain are produced in the area. Pop. (1951) 12,926.

Bressay. One of the Shetland Islands, Scotland. It is separated from the mainland by Bressay Sound, and is 6 m. long by 1 m. to 3 m. broad. Bressay parish includes the Isle of Noss, which has a bird sanctuary. The Cave of the Bard has stalactites and a strange echo. Paving and roofing stones are quarried, and ponies bred. Maximum alt. 742 ft. Area 11 sq. m. Pop. (1951) 335.

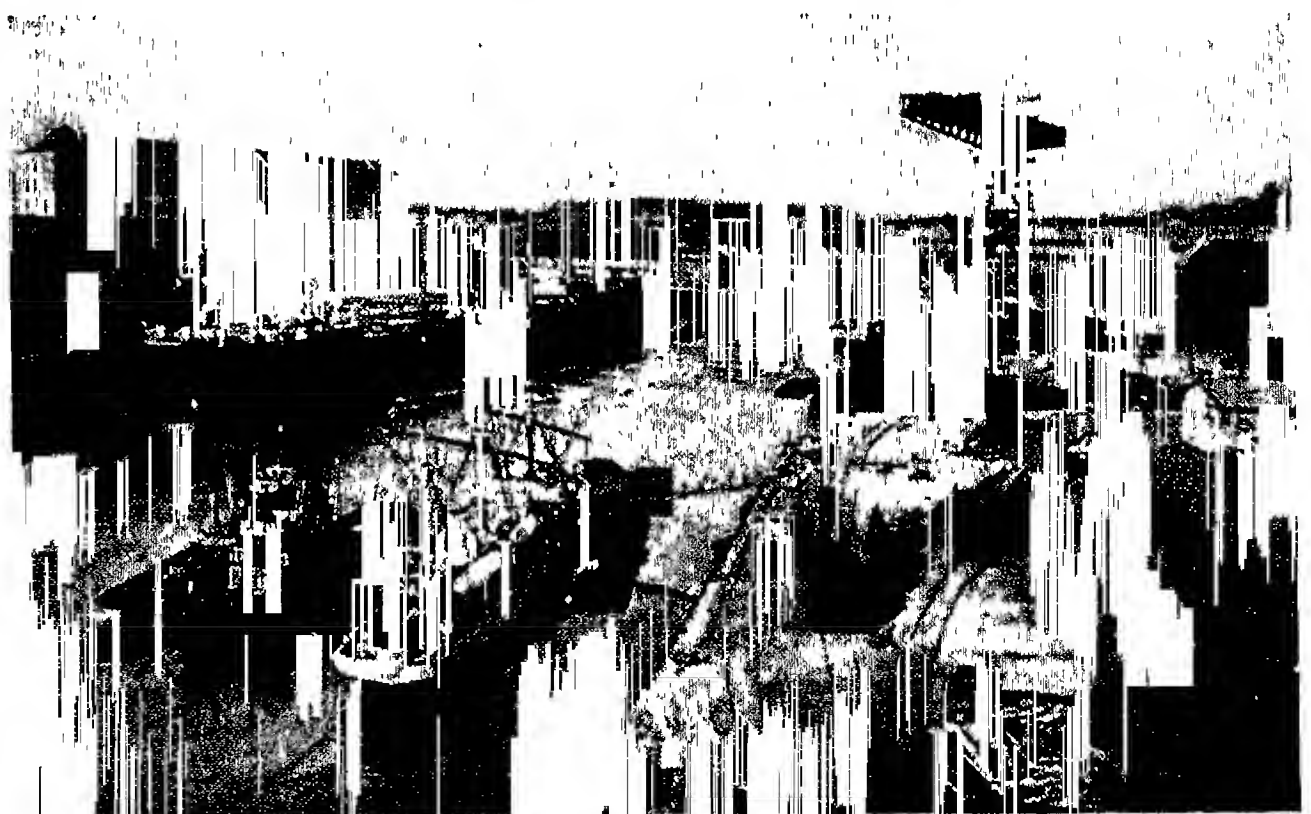
Bressey Report. Highway development scheme for Greater London prepared by Sir Charles Bressey (1874-1951) and Sir Edwin Lutyens (1869-1944), and published by the ministry of Transport in 1938. It envisaged a series of roads encircling London to divert traffic from the congested

West End and City areas; the cutting of five new motorways through undeveloped country to take fast motor traffic from the metropolis to Birmingham, Brighton, and other centres; tunnels under Hyde Park; and fly-over bridges across main thoroughfares. Nothing came of its recommendations owing to the outbreak of the Second Great War in 1939.

Brest. Fortified naval seaport and town of France, in the department of Finistère. It is in the extreme W. of Brittany, 155 m. W. of Rennes, on the N. side of a bay called Brest Roads which is large enough to hold a fleet of 500 ships. The river Penfeld falls into it, and its outlet to the ocean is the Goulet, 2 m. long, along the banks of which are the establishments of the French navy, shipbuilding yards, foundries, magazines, repairing and other docks, barracks, etc. Brest is also a commercial port, with ample docks—something like 6,000 ships enter the roadstead annually—and a fishing centre. It has chemical, brush, rope, and fertiliser factories, and near by are granite and porphyry quarries. Pop. (1954) 110,713.

There is a fine 12th-century castle, modified by Vauban. Long a Breton port, Brest belonged to England 1341-97. During 1513-1694 it was several times unsuccessfully attacked by the English. Richelieu made it a naval station in 1631, and Colbert continually improved it until it became the most important naval port in the kingdom.

In the Second Great War Brest was used as a supply port and maintenance depot for the B.E.F. until it was captured and occupied, June 20, 1940, by the Germans who used it as a submarine base. The German warships Gneisenau



Brest. The civil docks in this great French seaport and naval station

and Scharnhorst (*qq.v.*) lay in the harbour, 1941–42. They and other shipping, U-boat pens, and port installations were bombed by the Allied air forces 165 times (*see illus.* in page 202). The population fell to 2,000 people living in cellars. In one of these the Germans had stored ammunition which blew up killing 399 French. Brest was invested by U.S. troops by Aug. 12, 1944, but organized German resistance did not cease until Sept. 19. About two-thirds of the rebuilt town was devastated on July 28, 1947, when a Norwegian nitrate ship blew up in the harbour.

Brest. Town of White Russia S.S.R., better known by its former name Brest-Litovsk (Polish Brzesc nad-Bugiem). Capital of a region of the same name, it is situated on the Bug near its confluence with the Mukhavetz, about 120 m. S. of Grodno. It is important as a rly. junction, and a canal, 50 m. long, connects the Bug here with the Mukhavetz, which makes Brest a link in the inland waterway system extending from the Baltic to the Black Sea. The town has metal works, leather and food-processing industries, and sawmills which cut up timber from the forests of the region.

An old Slav town, anciently called Berestov (elm town), it was the Polish Brzesc Litewski until 1795, when it passed to Russia. The town, noted in ecclesiastical history for its congresses, 1590, 1594, and 1596, as a result of which a part of the Eastern Church was reunited with Rome, was ravaged in turn by the Mongols in 1241, the Teutonic Knights in 1379, the Crimean Tartars in the 15th century, and the Swedes in 1657 and 1706.

During the First Great War the town was the scene, 1917–18, of the conference between the Central Powers and the Bolsheviks which resulted in the treaty of Brest-Litovsk (*v.i.*), and the temporary occupation of the town by Germany. By the treaty of Riga, 1921, it became part of Poland.

After the invasion of Poland by Germany at the outset of the Second Great War, the Polish government moved to Brest-Litovsk from Warsaw, Sept. 11, 1939, but the Germans captured the town six days later. At the partition of Poland between the Germans and Russians the same month, Brest-Litovsk came within the Russian-occupied area, and was incorporated into White Russia as Brest. Overrun by the Germans June 23, 1941, Brest re-

mained in their hands until recaptured by Rokossovsky July 28, 1944. It lay in the area ceded by Poland to Russia by a treaty of 1945, ratified 1946. Pop. (est.) 50,000.

Brest-Litovsk, TREATY OF. Peace concluded between Germany and Russia, March 3, 1918, during the First Great War. Lenin and Trotsky, the Bolshevik leaders, overthrew the Kerensky government in Russia on Nov. 7 (N.S.), 1917, and in a manifesto issued next day pledged themselves to secure a general armistice or, if that proved impracticable, to dissociate Russia from the Allies, and negotiate a separate peace with the Central Powers. On Nov. 29 the German government agreed to receive Russian delegates at Brest-Litovsk (later called simply Brest).

The conference opened on Dec. 22, and the Bolsheviks made the following proposals: no annexations; armies of occupation to be withdrawn; right of self-determination to be given to all peoples; rights of minorities to be safeguarded; colonies to be returned; no economic boycott after the war. On Dec. 25 the Central Powers declared their acceptance of a peace without annexations or indemnities provided the Allies approved and would join in the negotiations. The Allies ignored the conference; and on Jan. 10, 1918, Trotsky announced that Russia intended to negotiate a separate peace.

Meanwhile the Central Powers made terms with the new Russian state of Ukraina (with which the Bolsheviks were at war), a peace being signed on Feb. 9. Trotsky refused to sign a formal treaty of peace; Germany suspended the armistice, and renewed hostilities against Russia. On Feb. 24 the Bolsheviks gave in, and the treaty of Brest-Litovsk was signed on March 3.

The Bolsheviks undertook to evacuate Estonia, Livonia, Finland, and Ukraina; the future of these countries was to be determined by the German and Austrian governments in consultation with their inhabitants. East Anatolia (Turkish Armenia), Ardahan, Kars, and Batum were likewise to be evacuated, and their future was to be decided by their inhabitants in consultation with Turkey. The Russian army was to be demobilised and Russian warships disarmed or immobilised. The political and economic independence of Persia and Afghanistan was to be respected. Terri-

torially the treaty put back the frontiers of Russia to where they stood in the 17th century; Russia lost a quarter of its population, a third of its best arable land, half its coalmines, and a third of its iron foundries.

By a proviso of the armistice of Nov. 11, 1918, with the western Allies, Germany repudiated the treaty of Brest-Litovsk.

Breteuil, LOUIS CHARLES AUGUSTE LE TONNELIER, BARON DE (1730–1807). French diplomatist. Born on March 7, 1730, at the castle of Azay-le-Féron (Indre), he began his career as a soldier, but soon changed to diplomacy, in which he showed great ability. He was ambassador at St. Petersburg 1760–70, then at Vienna, Naples, and again at Vienna. Returning to Paris in 1783 he was given a post at court which he held until 1788. Although the centre of the absolutist group favoured by Marie Antoinette, he was responsible for the order of 1785 which virtually abolished *lettres de cachet*, a potent instrument of absolutism. His appointment as minister of state on July 11, 1789, was one cause of the popular rising that resulted in the destruction of the Bastille on July 14. Breteuil went into exile, first in Switzerland and then at Hamburg. He returned to France in 1802, and died in Paris Nov. 2, 1807.

Brétigny, TREATY OF. Signed at Brétigny, near Chartres, France, on May 8, 1360, this treaty ended the first period of the Hundred Years' War between England and France. By its terms John of France, taken prisoner at Poitiers, was released; a ransom of 3,000,000 gold crowns was to be paid for him by instalments, hostages to remain in England until the debt was discharged. Edward III gave up all possessions north of the Loire except Calais, Guisnes, and Ponthieu; his sovereignty over Guienne and Gascony, Poitou, Saintonge, La Rochelle, the Limousin, and the Angoulême country was recognized. He renounced his claim to the French throne and to other parts of France, and gave up his alliance with the Flemings; John gave up his alliance with the Scots. The peace lasted only until 1369.

Breton, ANDRÉ (b. 1896). French poet and critic. One of the chief exponents of surrealism, he edited *La Révolution Surréaliste*, 1924, a publication that influenced contemporary painting and poetry. His surrealist manifestoes, 1924 and 1930, not only challenged

forms of representational art but related movements in art to political trends. As a poet he reflected the violent political turmoil of Europe during the 1930s. His best-known books included *Le Revolver à cheveux blancs*, 1932; *Position politique du surréalisme*, 1935; *L'Amour fou*, 1937; *Fata Morgana*, 1942; *La clé des champs*, 1954. During the Second Great War he went to the U.S.A., returning to France in 1946.

Breton, JULES ADOLPHE AIMÉ LOUIS (1827–1906). French painter. Born at Courrières, Pas-de-Calais, May 1, 1827, he studied under Félix de Vigne at Ghent and Drolling in Paris, and made his début at the Salon in 1849 as a genre painter. After 1851 he confined himself to landscape and rural life. *La Bénédiction des Blés*, in the Luxembourg, is the best known of his pictures. He also published vols. of verse, e.g. *Les Champs et la Mer*, 1875. He died in Paris July 5, 1906.

Breton, NICHOLAS (c. 1545–1626). English poet. Son of a London merchant and educated at Oxford, he was a prolific writer of verse and prose. He is best remembered by his charming little pastoral of *Phyllida and Corydon* (In the Merry Month of May), contained in England's *Helicon*, 1600, and his pamphlet in prose and verse. *The Will of Wit*, 1599. A privately printed edition of his works, edited by A. B. Grosart, appeared in 1879. Breton's name was pronounced Britton.

Breton de los Herreros, MANUEL (1796–1873). Spanish dramatist and satirist. Born at Quel, Dec. 19, 1796, he was educated at Madrid. He served in the army 1812–22, was sub-librarian at the national library, Madrid, 1831–40, and was secretary to the Spanish Academy from 1842 until his death, Nov. 8, 1873. His *Merope* is one of a series of tragedies, but he excelled in comedy. The *Letrillas*, lyric poems, are in the poet's lighter mood. Of his 360 plays the best is *Escuela del Matrimonio* (the school of marriage), 1851.

Breton Language AND LITERATURE. Breton, the language of Brittany in N.W. France, is a member of the British group of Celtic languages, and very similar in structure to Welsh and Cornish. It was introduced during the 5th and 6th centuries by immigrants from Britain, and is to be distinguished from Gaulish, which went out of use several centuries earlier. In spite of discouragement by the French government, Breton remains the most widely-spoken of

the modern Celtic languages, its speakers numbering about a million (in 1898 there were over half a million monoglot Bretons). There are four main dialects—those centred on Saint-Pol-de-Léon, Tréguier, and Quimper do not differ widely; that of Vannes is sufficiently different to require separate study. Since the early 19th century, when Le Gonidec published his grammar and dictionary, a mainly artificial literary language has also been in use.

The earliest written Breton is found in glosses and proper names in Latin manuscripts (8th–15th centuries); and a few scraps of verse occur in a 14th-century manuscript. The literature of the 15th to 17th centuries is mainly religious and derivative. It is both in prose and verse and contains three mystery-plays, *The life of Ste. Nonne*, *Le grand mystère de Jésus*, and *Le mystère de Sainte Barbe*. The modern literature begins in the 17th century with, mainly, more miracles and mystery plays. In the 18th century a decline set in, but this was followed in the 19th by a revival due chiefly to the scholarly activity of Le Gonidec. It was in this century that the genuine ballad literature of Brittany first saw the light. Since the end of the 19th century literature both in prose and verse has been produced in increasing volume, not only in the literary language, but also in the various dialects.

Bretonneau, PIERRE (1778–1862). French physician. Born at Tours, April 3, 1778, he was the first man to perform the operation of tracheotomy for croup, 1825, and he also made a study of typhoid, which he predicted would be differentiated from typhus. His chief work, *Des inflammations spéciales de tissu muqueux*, appeared in 1826. In 1855 he enunciated the germ theory of disease. Bretonneau, who died Feb. 18, 1862, gave diphtheria its present name.

Brett, GEORGE HOWARD (b. 1886). American soldier. Born Feb. 7, 1886, and educated at Virginia military institute, he graduated from the Army Air Corps tactical school and War College. Having served in the First Great War with the U.S. air force, he retired in 1920, but returned to the service in 1930. As major-general, after Japan attacked Pearl Harbor, Dec. 7, 1941, he became American representative on the Allied council at Chunking for the common prosecution of the


war. In 1942 Brett was promoted lieutenant-general and appointed deputy supreme commander of the S.W. Pacific area. He was in command of the Caribbean area, 1942–46, and retired 1946.

Bretton Woods. Town in New Hampshire, U.S.A. Here, at a conference held July 1–22, 1944, representatives of the 44 countries then forming the United Nations recommended the establishment of an international monetary fund to promote exchange stability after the end of the Second Great War; and of an international bank for reconstruction and development to assist in making post-war reconstruction as rapid as possible by providing capital for projects which would raise the productivity of the borrowing country. Both organizations came into being on Dec. 27, 1945. See *International Bank for Reconstruction*; *International Monetary Fund*.

Bretwalda (A.S., overlord). Word or title used in the Anglo-Saxon Chronicle. The old idea was that the eight rulers mentioned there, and also by Bede, as having this title were the recognized superiors of the other English kings. Probably the word was used for an overlord whose authority was virtually nominal.

Breughel. Spelling sometimes used for the name of the Flemish painters Brueghel (*q.v.*).

Breuil, HENRI ÉDOUARD PROSPER (b. 1877). French abbé and prehistorian who convinced his fellow scholars of the antiquity of cave paintings found at Altamira (*q.v.*) and elsewhere. Born Feb. 8, 1877, at Mortain, Manche, he was associated with the discovery of the paintings in the caves of Font de Gaume and Combarelles, in Dordogne, and in 1901 published his opinion that they were the work of prehistoric man of the Magdalenian period. He convinced the sceptical scholars of the day of the truth of this opinion, and that the paintings discovered in 1879 in the cave of Altamira (itself discovered in 1875) were also prehistoric. In 1910 he was appointed professor at the Institut de paléontologie humaine at Paris on its foundation by Prince Albert of Monaco, and it became his life work to study and record ancient cave art, for which work his outstanding gifts as an artist and draughtsman rendered him exceptionally fitted. His studies took him far afield and included investigation of paintings in France, Spain, and S.W. Africa.

Breve (Lat. *brevis*, short). Musical note of the time-value of two semibreves, written thus ||||. In the Middle Ages it was a short note, hence the name. The longer notes then used are now obsolete, leaving the breve as the longest note of today, used mainly in church music. See Alla Breve.

Breve. Scots law term for a writ in the king's name directing a judge to try by jury the points therein stated.

Brévent. Mt. of France, in the Pennine Alps. Situated N.W. of Chamonix, it is 8,284 ft. high and commands a view of Mont Blanc.

Brevet (Fr.). Term used in France in the days of the monarchy in the sense of the English term commission, *i.e.* a written authorisation to assume the functions of an officer in the navy or army. Brevet in the British army is a mid-grade rank other than regimental formerly given to three grades of officers: captain with six years' service could be a brevet major, a major a brevet lieutenant-colonel, a lieutenant-colonel a brevet colonel. Such promotions were said to be by brevet, which is a recognition of special merit.

Brevet rank was suspended in 1943, but in 1952 was restored in respect of promotion from major to lieutenant-colonel.

In the infantry and cavalry a captain having higher rank by brevet received the pay of a junior major, but in the artillery and engineers he received an intermediate rate between that of captain and major. When in the course of regimental promotion the major who is a brevet lieutenant-col. is given substantive rank as a lieutenant-col., his brevet lapses but his seniority in substantive rank runs from the date of brevet.

The term brevet as popularly given to the flying badge worn on the left breast by certain R.A.F. aircrew derives from the brevet or certificate issued to a pilot on completion of training. The oldest R.A.F. brevets are the pilot's wings and the observer's half-wing with the letter O. During the Second Great War brevets were authorised for air gunners, signallers, navigators, bomb aimers, and flight en-



Brevet. R.A.F. pilot's brevet and (upper picture) air gunner's brevet of the Second Great War

gineers. These consisted of single half-wings attached to a laurel wreath surrounding the letters AG, S, N, B, or E respectively. Development of the fast jet-bomber carrying a small crew of specialists, each combining several duties, resulted in a reduction of the variety of brevets. An airman relegated to ground duties is not deprived of his brevet.

Breviary (Lat. *breviarium*, summary). Originally a compendium of the Psalter and Christian prayers, the term has been applied since the 11th century to the complete book of prayers for the daily offices in the Roman Catholic Church. It is divided in four seasonal parts.

The daily office contains the short service for the canonical hours, *i.e.* Prime, Terce, Sext, Nones, and Vespers, with the night office of Compline and the long midnight and early morning services of Matins and Lauds. There are also special offices of the Blessed Virgin and of the Dead, and the supplementary offices of each diocese. In addition to a certain number of psalms, a lesson from the Bible, and a hymn with antiphons, responses, versicles, and collects make up each office. Readings from the fathers and from the lives of the saints are also included in the longer offices. Each eccles. season of the year has its own proper office, while the saints' days for the most part have offices common to various groups of saints, *e.g.* apostles, martyrs, virgins, etc. It is obligatory on all R.C. clergy to say daily the appropriate office from the breviary, and in cathedrals and the houses of religious orders the offices are commonly said or sung by the community.

From the 4th century various books came into use containing the Psalter, the Old and New Testaments, legends of the saints, antiphons and prayers, and writings of the fathers. These were abridged and made into a breviary by Pope Gregory VII (1073-85). The Benedictines and other religious orders already at that time had their own service books. Under Pope Innocent III (1198-1216) the modern breviary came into being.

It has been frequently revised, notably by Cardinal Quignonez in the 16th century, and by Popes Pius V (1566-72) and Urban VIII (1623-44). The many local and diocesan breviaries then in use were withdrawn in favour of the

Roman breviary of Pius V, and only those that could show an existence of 200 years were authorised. Apart from the office books of certain religious orders, and the ancient uses at Milan and Toledo, the Roman breviary is in common use throughout the Roman Catholic world. An English translation was issued by the marquess of Bute, 1879.

Brevier. Name of an obsolete size of printing type, roughly equivalent to 8-point. About 9 lines make an inch. It is one size larger than minion and one size smaller than bourgeois. It was originally used for printing breviaries, hence its name.

Brewer, JOHN SHERREN (1809-79). British historian. Born at Norwich and educated at Queen's College, Oxford, he was ordained in 1837. In 1839 he became lecturer in classics, and in 1855 professor of English literature and lecturer in modern history at King's College, London. He arranged and edited for the Master of the Rolls the first four volumes of Letters and Papers of the Reign of Henry VIII, 1862; the first volume of Monumenta Franciscana, 1858; and works of Giraldus Cambrensis, 1861, and of Roger Bacon, 1859. His chief work was done for the Record Office, but he also wrote for the London press, and for a time was editor of The Standard. In 1877 he resigned his professorship at King's College for the living of Toppesfield in Essex, where he died, Feb. 16, 1879.

Ebenezer Cobham Brewer (1810-97), his brother, was the compiler of many books of useful knowledge. Born in London, May 2, 1810, and educated at Trinity Hall, Cambridge, he wrote A Guide to the Scientific Knowledge of Things Familiar, 1848; A Political, Social, and Literary History of France, 1863; Dictionary of Phrase and Fable, 1870; The Reader's Handbook of Allusions, References, etc., 1880; A Dictionary of Miracles, 1884. He died March 6, 1897.

Brewers' Company. Fourteenth of the livery companies of the city of London. Incorporated in 1438, it once bore the arms of Thomas Becket impaled with its own; a crest was substituted,



E. C. Brewer, book compiler

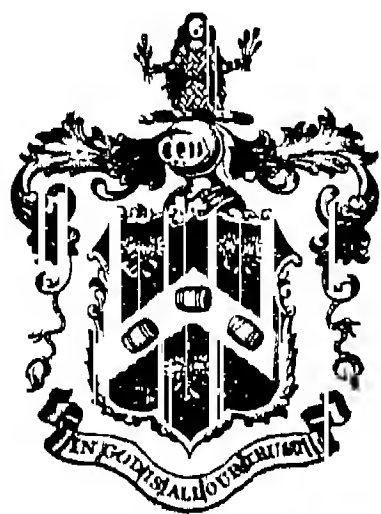
1544. The hall, in Addle Street, E.C., was burnt in 1666; it was rebuilt 1670-73; and destroyed by German bombs in Dec., 1940. Offices were opened at 18, Mansfield St., London, W.1.

The company maintains almshouses at South Mimms and elsewhere, and its benefactions to education include assistance to Aldenham and North London Collegiate Schools.

Brewers' Grains. Insoluble residue of malt left in the mash tun after the wort has been run off and the remaining sugars and other soluble matters removed by sprinkling with water. The grains then contain about 75 p.c. of water and are sometimes used in this condition for feeding cattle, but as they rapidly become sour, especially in hot weather, it is common to dry the grains by pressing out as much water as possible and passing them through a drum heated by a steam coil. The dried product has the following average composition: water 9; fat 7; protein 18; mineral matter 4; crude fibre 20; digestible carbohydrates 42 p.c. The food value is about 1,400 calories per lb., which is in close agreement with that of an equal weight of the original barley. This dried material is easy to store and is used as fodder for cattle, sheep, and horses.

Brewing. The process of producing a liquor by fermentation of a cereal extract. It was probably first associated with the production of leaven for making bread. Beer made from grain was drunk in ancient Mesopotamia and Egypt. In ancient Greece and Rome, beer was considered a crude drink and Tacitus, writing about the Germanic tribes, says: "Their drink is a liquor prepared from barley or wheat brought by fermentation to a certain resemblance to wine." Although there are few classical references to brewing, the process was known to most north European peoples before the Christian era.

The words ale and beer are of Teutonic origin, but the original distinction between the two beverages is obscure. In later medieval times it would appear that ale was brewed from malt



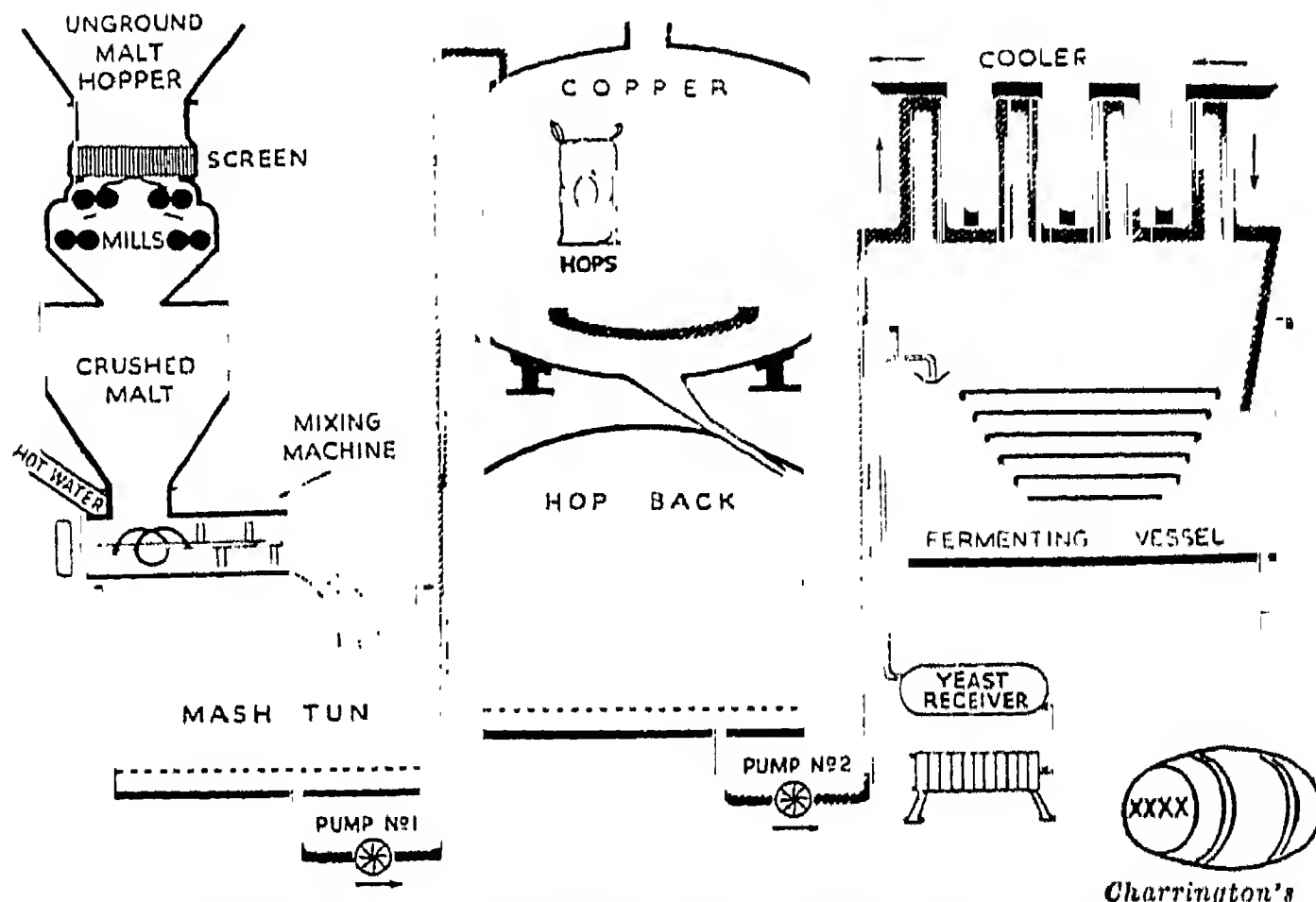
Brewers' Company arms

alone, and that the addition of hops and other herbs to the brew constituted beer. In 1524 Flemish immigrants began systematic cultivation of the hop in England and by the end of the 16th century the addition of hops to ale brews had become such regular practice that the distinction between ale and beer disappeared.

Malted barley and hops are the essential raw materials of brewing in all countries. Small amounts of oats or other grain may be incorporated, and the addition of dextrose or cane sugar is not uncommon. In the U.K. only materials authorised by the Excise authorities may be used. The character of beers is greatly influenced by the nature of the water used in brewing. A hard water containing calcium sulphate is desirable for pale ales, while a more alkaline water is preferred for mild ale and stout. Whatever the brew, it is essential that the water be of good potable quality, and free from organic matter or any

passes into a mash tun at a temperature between 145° and 155° F. The mash tun is a circular, covered vessel fitted with a perforated base, mechanical rakes for stirring, and an overhead water spray. The mash remains for about two hours at its original temperature. This liquefies the enzyme diastase and breaks down the malt starch to fermentable sugar maltose, along with a proportion of unfermentable dextrin; these dissolve to form a sweet malt-flavoured liquid which is run off from the insoluble residue and collected in a stainless steel or copper vessel. The vessel is heated either by direct fire or by a steam jacket and internal coils.

The extract from the malt, called the wort, is boiled and hops are added at a rate of one to five lb. per barrel according to the strength and type of the beer. Boiling is continued for one to two hours: this destroys any diastase remaining, aids the solution of the preservative and flavouring constituents of the hops, causes the precipitation of some of the complex malt proteins, and sterilises the wort. During cooling an



Brewing. Diagram illustrating the process of turning malt into beer

undesirable impurities. An abundant supply of water is also needed in breweries for steam raising, cleansing equipment, and washing casks and bottles. A brewery uses approximately seven barrels of water for every barrel of beer produced.

The first operation in brewing is to grind the malt between steel rollers. Pale malts are used alone, or mixed with roasted malt for the darker beers. The ground malt is stirred in hot water until it has a porridge-like consistency, when it

additional quantity of protein is precipitated together with some of the coarser flavoured hop constituents.

When it has cooled to about 60° F. the extract is run into fermenting vessels containing yeast. The strength of the extract, as measured by the specific gravity, and its volume are gauged by the brewer, and by an excise officer who assesses the duty to be paid. In a few hours multiplication of the yeast cells gradually breaks down the maltose with copious evolution

of carbon dioxide gas and formation of alcohol which remains in solution. This primary fermentation continues for three to six days, when most of the yeast separates as a compact layer on the surface of the beer and is skimmed off.

At this stage the beer is slightly cloudy because of the yeast, protein, and hop débris remaining in suspension. Clarification is assisted by the addition of a small amount of isinglass-solution, called finings, which, coagulating as fine flocculent particles, entangles the suspended matter and, forming a deposit, leaves the beer bright. The colour is adjusted by adding caramel. A sweet beer is produced by adding sugar. The hop aroma and flavour of pale ales and of strong beer can be improved by a process called dry-hopping, in which fresh unboiled hops of selected quality are added at the rate of a few ounces per barrel.

Conditioning the Beer

High-gravity beers for draught sale are conditioned in casks or in storage tanks for periods up to a year at a temperature of approx. 55° F. Beers for bottling may be similarly conditioned, but at temperatures of between 30° and 36° F. The duration of the low-temperature storage governs the subsequent "shelf life" of the bottled beer.

Draught beer is sometimes sent to the retailer without further processing, the clarification by fining being done in the retailer's casks, and its condition maintained by a gentle fermentation of the yeast deposit in the cask; but a considerable amount of draught beer is filtered and carbonated at the brewery and dispatched for immediate consumption.

Beer is transported to retailers either in casks or in bulk. The casks are of oak or stainless steel and range in size from the barrel of 36 gallons to the pin containing 4½ gallons. The casks are kept in the retailer's cellar, and in most houses the beer is raised to the counter by a pump or by a pressure of air or carbon dioxide applied to the cask. Bulk delivery is by tankers which discharge the beer into stoneware or stainless steel vessels of 50 to 100 gallons capacity in the retailers' cellars.

Some bottled beers are what is called naturally conditioned by bottling them when they still have a certain amount of their yeast in suspension; consequent fermentation in the bottle produces suf-

ficient carbon dioxide to condition the beer. Such beers retain a deposit of yeast in the bottle and must be decanted carefully. Most bottled beers are conditioned in bulk in the brewery, saturated with carbon dioxide, and filtered under pressure into bottles or, occasionally, cans. After bottling, filtered, non-deposit beers are sometimes pasteurised at a temperature of 135° to 140° F. for about 15 minutes.

Lager Beers

Lager beers are brewed by a procedure called decoction mashing. The initial mixture of malt and water is made at 120° F. or even lower, and after it has stood for a time part of the mixture is drawn off, brought to the boil and returned. The liquid extract is then drawn off, boiled with hops, and cooled. The fermentation range is 45° to 55° F., using "bottom" yeast which does not rise in a barm (froth) but settles as a deposit in the fermenting vessel. Lager beers are conditioned for several months at temperatures of between 30° and 40° F., during which time a slow secondary fermentation produces the characteristic lager flavour.

In the U.K. the brewing unit is the barrel of 36 Imperial gals. In the U.S.A. the beer barrel is 31 U.S. gals., equivalent to 25.8 Imperial gals.; on the continent of Europe the unit is the hectolitre, equivalent to 22 Imperial gals. One U.K. barrel equals 1.4 U.S. barrels or 1.6 hectolitres. Barley is reckoned in quarters of 4 cwt. (448 lb.), malt in quarters of 3 cwt., and sugar in quarters of 2 cwt.

By the Finance Act of 1880 U.K. brewers are required to declare the strength of worts in terms of specific gravity relative to water at 60° F. as 1,000, degrees of gravity being the figure in excess of 1,000. In the U.S.A. and continental European countries, plato, brix, or balling hydrometers are used, all similarly graduated in percentage of sugar solids. Degrees of gravity on the U.K. scale divided by four gives an approximate conversion to these other scales.

The strength of beer is expressed in terms of the original specific gravity of the wort before fermentation, and in the U.K. the brewer is required to collect the wort in gauged vessels and to declare to the Excise the quantity and specific gravity. As fermentation proceeds, the actual specific gravity of the wort, as measured by a hydrometer, decreases, but by

determination of the alcohol content and the residual gravity the original declared gravity can be ascertained.

The standard gravity of beer brewed in the U.K., fixed in 1889, is 1,055. Duty was formerly levied by relation to barrels of standard gravity, though there was no obligation to brew at this gravity. The standard barrel has been superseded as the basis of duty, but it is retained as a convenient statistical value representing the amount of malt and other materials used in brewing, and by comparison with the corresponding figure for bulk barrels the average gravity of beer can be ascertained.

From 1914 most draught and bottled beers have been brewed at gravities between 1,030 and 1,050, though certain brands have been consistently maintained at the standard gravity of 1,055. Most breweries produce a strong beer of original gravity between 1,070 and 1,105. Lager beers are usually of a gravity from 1,030 to 1,050.

Excise Duty

Duty is levied in the U.K. at a flat rate on all beers up to a minimum original gravity, with additional duty per degree on worts declared above this figure. The minimum gravity, usually about 1,030, and the duty per degree excess vary according to the annual Finance Act. The alcohol content of beer is roughly proportional to the original gravity but is not defined and is not the basis for assessment of duty.

The residual carbohydrate and protein in a beer, together with the alcohol, provide readily available calories and on this basis the food value of beer may be calculated by the formula

$$\text{Degrees of Gravity} \times 5.2 \\ = \text{calories per pint.}$$

A pint of beer of original gravity 1,035, such as a mild ale or light bitter, provides 182 calories.

The insoluble residue of malt left in the mash tun after the extract has been run off is called brewers' grains (*v.s.*). Spent hops are used as fertiliser. Surplus yeast is processed for human consumption as yeast extract, or dried as a flake preparation for pig and poultry feeding. Fermentation gas is sometimes collected and purified for carbonating bottled beer and mineral waters. *See also* Malting. *Consult* *Brewing Science and Practice*, H. Lloyd Hind, 1938; *Biochemistry of Brewing and Malting*, R. H. Hopkins and C. B. Krause, 1947; *Art and Science of*

Brewing. C. A. Kloss, 1949; Biochemistry of Brewing, I. A. Preece, 1954.

Brewing, INSTITUTE OF. Technical and research establishment of the brewing and allied industries. Started in London in 1886 as the Laboratory Club, it was renamed the Institute of Brewing in 1890, and amalgamated with other similar institutes 1904. It is established under the Literary and Scientific Institutions Act of 1854 and was granted armorial bearings in 1937. Meetings and discussions are held monthly by the six sections in the U.K.; the Australian section holds a convention annually. Examinations for diploma and associate members are held annually in June. The journal of the institute is published in alternate months. A central research station was established in 1951 at Lyttel Hall, Nutfield, Surrey. The h.q. of the institute is at 33 Clarges Street, London, W.1.

Brewster, SIR DAVID (1781-1868). British scientist and inventor. Born Dec. 11, 1781, at Jedburgh, he



was ordained a Presbyterian minister in 1804 but soon afterwards abandoned the ministry for teaching and scientific study. In 1810 he married Juliet, daughter of James Macpherson of Ossian fame.

From 1813 onwards Brewster contributed to the Royal Society of London a number of papers on the properties of light, and in 1816 the French Institute awarded him half their prize of 3,000 frs. (then about £120) for the most important discoveries in physical science in Europe during the previous two years. He introduced the holo-photal system of lighthouse illumination, which utilises the whole light of a lamp, whether reflected or refracted. He was a prolific writer and during 1806-68 published 315 papers on scientific subjects, besides a treatise on optics, 1831, and a life of Newton, 1832. He was editor of the Edinburgh Encyclopedia, 1808-30. Elected F.R.S. in 1815 and awarded the Copley Medal, he was knighted 1831 and granted a civil pension. He was appointed in 1837 principal of the united college of S. Salvador and S. Leonard at St. Andrews. In 1859 he was appoint-

ed principal and in 1860 vice-chancellor of Edinburgh University. He died Feb. 10, 1868.

Brewster, WILLIAM (c. 1560-1644). Pilgrim Father, and ruling elder in the church at New Plymouth. He was associated with the Brownists (Independents who later adopted the name Congregationalists) at Scrooby, Notts. He sailed in the Mayflower, and helped to found Plymouth colony.

Brewster Sessions. The general annual meeting of licensing justices in the English counties and boroughs, held during the first 14 days of Feb., to consider applications for licences by retailers of intoxicating liquors. A notice giving day, hour, and place of brewster sessions is posted on the church door or other place. Brewster is an old form of brewer.

Brezno. Town and district of Czecho-Slovakia. Formerly called Breznobanya, it was in the kingdom of Hungary. The town is situated on the river Gran among the Tatra mountain ranges, 42 m. by rly. N.E. of Zvoleň. Of the inhabitants three-quarters are Slovaks, the rest Magyars.

Brialmont, HENRI ALEXIS (1821-1903). Belgian soldier and engineer. Born at Venlo, in Dutch Limburg, May 25, 1821, he was educated at the military school, Brussels. He made a special study of the principles of fortification, and, appointed inspector-general of fortifications on the general staff, 1875, he designed and superintended military works, especially those on the Meuse. In 1883 he executed the fortified defences of Bukarest. Returning to Belgium in 1884, he completed the fortifications of Antwerp, Liège, and Namur, and retired in 1886. He died July 21, 1903. He published a number of works on fortification and on military engineering.

Brian (926-1014). King of Ireland. Called Brian Boru, Boruma, Boroma, or Boraimhe, he was a son of the Dalcassian prince Cenneide (Kennedy), and grandson of Lorcán, king of Thomond, in Munster. He succeeded his murdered brother Mathgamain (Mahon) in 976 as king of Thomond, in 978 became king of Munster, and in 1002 deposed the ardri, or chief king, Maelsechlainn, and became chief king of Ireland. On Good Friday, 1014, his forces totally defeated the Danes in the battle of Clontarf, but Brian, too old to fight, was slain in his tent.

Brian was a redoubtable warrior, and is credited with 25 battles against the Danes, whose power he

certainly destroyed. The charter which he gave to Armagh in 1004 can be seen in the library of Trinity College, Dublin. His agnomen may be derived from the tribute (Irish, *boroma*) he received, or from the name of a village near Killaloe, co. Clare.

Briançon. Town of France, capital of the dept. of Hautes-Alpes. It lies 4,334 ft. above sea level, 51 m. by rly. N.E. of Gap. The Brigantium of the Romans, it was in the Middle Ages within Dauphiné. It was given to Savoy in 1713 and regained by France in 1860. Vauban remade the fortifications in 1692. The position of Briançon is good strategically: it commands four valleys and three main roads, one of which is the way to Italy. After Waterloo the Allies besieged it unsuccessfully, Aug. to Nov., 1815. It was heavily bombed by the Germans in 1945. The upper town, with steep, narrow streets, is picturesque. A streamlet runs down the middle of the main road. There is an 18th-century church and two fine gates. Development of hydro-electric power in the area has encouraged industry, and there are cloth mills, cheese factories, and sawmills. Pop. (1954) 8,274.

Briand, ARISTIDE (1862-1932). French politician. A member of the chamber of deputies for 40 years, six times prime minister, 18 times a cabinet minister: so briefly might one of the greatest Europeans of the 20th century be described.



Aristide Briand, French politician

Born March 28, 1862, at Nantes, the son of a Breton wine-shop keeper, he became a solicitor in his native town. After a few years he was temporarily struck off the roll because of a small-town scandal. He turned to politics as a socialist, and for nearly 20 years wrote for left-wing papers, and practised in the courts where he often defended without fee clients unable to afford one, and trained himself in eloquence. A deputy from 1902, he advanced rapidly: in 1906 he was minister of education in Sarrien's cabinet, stayed in that capacity under Clemenceau, and completed the separation of church and state in education.

From July, 1909, until Feb., 1911, Briand was prime minister; he held supreme authority during

a great railway strike, and became the leader of a small "social republican" group whose action was often decisive. He was premier again in 1913, minister of justice in Viviani's war cabinet of Aug., 1914, and again head of the government in Oct., 1915. Responsible for French participation in the Salonica expedition, as a result of its failure he lost office in March, 1917; yet his influence had brought Rumania and Italy into the war on the Allied side.

Prime minister and foreign minister in 1921, Briand took part in the Washington naval disarmament conference and in the Cannes conference, where his sounding of the possibilities of a Franco-German understanding brought Poincaré to the front of his adversaries. Overthrown by Poincaré, Briand was out of office until the left-wing coalition victory in the elections of 1925.

Briand as European Statesman

During 1925-26, in cooperation with Austen Chamberlain and Gustav Stresemann, Briand established a world-wide reputation as a champion of the unification of Europe, on the ground of economic necessity. The Locarno Pact, Oct. 16, 1925, guaranteeing in the form of a collective obligation the frontiers of the western powers in the Rhineland, resulted from that combined effort; Germany's entry into the League of Nations was one of its terms. For their work towards the pacification of Europe Briand and Stresemann shared the Nobel peace prize in 1926.

In 1928 Briand had a decisive share in securing general acceptance of the Kellogg Pact. In 1929, during The Hague conference on reparations, he promised the dying Stresemann total evacuation of the Rhineland. In 1930 Briand launched his most ambitious scheme in a memorandum on the "economically united states of Europe." It was accepted in principle by all European governments, but the world economic crisis and the conflict at Geneva over disarmament prevented it from coming on the League's agenda. Briand remained foreign minister, but, hampered by Laval's ambition, he withdrew in Jan., 1932, to his small estate at Cocherel in Normandy where he died from heart failure March 7, 1932.

Briand began as a socialist and developed into the representative of the cultured, sceptical, and worldly-wise French bourgeoisie. He had been a professed atheist,

but died a devout R.C. These changes of heart matched the development of his self-imposed mission as the conciliator of the nations. He exercised a personal fascination upon friends and foes alike, and his gifts of oratory earned him the nickname of the Sorcerer. *Consult* Briand: Man of Peace, V. Thompson, 1930.

Briansk OR BRYANSK. Town of the R.S.F.S.R., capital of a region of the same name. On the Desna, the town is 200 m. S.W. of Moscow. A river port and an important rly. junction, it has an arsenal, large iron and cannon foundries, glass, machinery, and railway-carriage works, sawmills, and a trade in leather, spirits, cereals, and salt. Its cathedral dates from 1526, and was restored at the close of the 17th century. During the Second Great War the Germans, who were in occupation of Briansk during Oct. 12, 1941-Sept. 17, 1943, made it one of their strongest bastions; its recapture by the Russians involved several days' bitter fighting. Pop. (est.) 90,000.

Briansk region, area 13,400 sq. m., pop (est.) 1,800,000, is important agriculturally, producing hemp, potatoes, and pigs. There is considerable industrial development, especially in the neighbourhood of the capital.

Brianza. District of Italy, in the prov. of Como. It lies between the Lambro and the Adda, and includes the peninsula between the two branches of Lake Como. Comprising mts., small lakes, and fruitful valleys, it is called the garden of Lombardy. It was celebrated by poets (e.g. Parini), and many of its 18th- and 19th-century villas, the country houses of the Milanese aristocracy, have artistic merit.

Briar OR BRIER. (A.S. *brer*). Common name for various species of wild rose (*Rosa*) of the family Rosaceae. There are probably more than a hundred species of this genus occurring in north temperate and sub-tropical regions. They include the sweet briar or eglantine (*R. rubiginosa*) and the dog rose (*R. canina*) of British hedgerows.

Briareus OR AEGAEON. In Greek mythology, one of the Hekatoncheires or fifty-headed hundred-armed sons of Uranus (heaven) by Gaea (earth). Homer says he was called Briareus by the Gods, and Aegaeon by men. According to one myth, Zeus (Jupiter) summoned Briareus and his brothers Kottos and Gyges to

help the gods against the Titans, and later set them to guard the defeated giants in Tartarus. In another myth Briareus and his brothers themselves rebelled against Zeus, and were imprisoned under the earth; and they are sometimes called sons of Poseidon (Neptune), Aegaeon then becoming a sea-god of the Aegean, and all three representing destructive powers of nature. Another attempt to explain the myth suggests that the hundred-armed monsters were the oared ships of a superior civilization whose alliance with some primitive dynast enabled him to crush a rebellion of his own family or people.

Briar Root (Fr. *bruyère*, heather). Root wood of the tree-heath (*Erica arborea*) of the family Ericaceae, a common plant of S. Europe. It is hard and fine-textured and will take a high polish. These characteristics, and the fact that it chars very slowly, make it suitable for manufacture into tobacco-pipes. It is too small to be of much other use.

Bribery. Bribery is giving or receiving any reward as an inducement to betray a trust or duty. In English law bribery of any officer or official (e.g. a constable) is a common law misdemeanour punishable by fine and imprisonment. The Prevention of Corruption Act, 1906, relates to bribery of agents of all kinds and makes it an offence for anyone corruptly to give or to offer to an agent, or for an agent corruptly to obtain or to seek to obtain, any gift or consideration as an inducement or reward for doing or forbearing to do, or for having done or forborne to do, any act in relation to his principal's affairs, or for showing or forbearing to show favour or disfavour to any person in relation to his principal's affairs. For anyone knowingly to give an agent, or for an agent knowingly to use, any false receipt or other document so as to mislead the principal is also an offence. The maximum penalty for these offences is two years' imprisonment and £500 fine on conviction on indictment, and four months' imprisonment and £50 fine on summary conviction. The principal may dismiss the agent and also recover the bribe from him.

In addition to these general provisions, it is, under the Public Bodies Corrupt Practices Act, 1889, an offence for a member, officer, or servant of a public body corruptly to solicit or receive, or

for anyone corruptly to give or offer him, a gift for doing or forbearing to do anything in respect of any matter in which the public body is concerned. The maximum penalty is two years' imprisonment and £500 fine with in addition the payment of the amount of the bribe to the public body. The person convicted may be disqualified from holding public office for seven years or, on a second conviction, disqualified for ever and declared incapable of voting for seven years. If he is an officer or servant of a public body he may forfeit any compensation and pension that would have been due to him on the normal termination of his service.

Where the offence under either of the above acts is connected with a public contract the maximum imprisonment is seven years. Further, when an employee of the government or of any public body receives any gift from a person holding or seeking a public contract, the gift is deemed to be corrupt unless the contrary is proved.

Under the Honours (Prevention of Abuses) Act, 1925, it is an offence for any person to obtain or attempt to obtain or to give

or to offer any gift as an inducement to procure any title or honour. The maximum punishment on conviction on indictment is two years' imprisonment and £500 fine, and on summary conviction three months' imprisonment and £50 fine, together with forfeiture of the gift to the crown.

There are special acts relating to bribery of customs officers or revenue officials. Bribery of a juror is called embracery.

Bribery in connexion with a parliamentary or local government election is in the U.K. a corrupt practice under election law and is a very serious offence. *See Corrupt Practices.*

Brice (d. 444). Saint and bishop of Tours. Brought up a monk under S. Martin in the monastery at Tours, he succeeded him in the bishopric in 397. Suspected of various crimes, he retired to Rome, where he remained for 17 years. Then, his innocence having been established by Pope Celestine I, he returned to his see, which he held until his death. He is commemorated in the Book of Common Prayer and in the Roman Catholic Church on Nov. 13.

The so-called S. Brice's Day massacre of Danes in England in 1002 took place in fact on Nov. 12.

BRICK, BRICKMAKING, BRICKWORK

An account of the brick and its long history; how it was made in antiquity and is made today, both by hand and by machinery; and how it is used. Additional information relating to bricks and their uses will be found under Architecture; Bonding; Bridge; Building; House, etc.

A brick is a shaped and burnt block of clay used for building. Man's earliest building materials were wood and loose, preferably flat, stones, but in Mesopotamia, where the first great civilizations developed, wood and stone were scarce, and builders had of necessity to use local soil. Walls were built up from layers of mud mixed with chopped straw, each layer being left to dry in the sun before the next was laid. A later improvement was to form the mixture into lumps, or bricks, of a standard size. Moist earth, to which straw was added to give cohesion, was pressed by hand into a wooden mould and dried in the sun. These early bricks would soon have crumbled if they had been used in a wet and temperate climate, but they were exceptionally durable where the weather was dry and hot.

The Babylonians revolutionised brickmaking by using clay and burning or firing it at a high

temperature. Bricks made by that method stand comparison with present standards, and the remains of some fine brick structures survive after 3,000 years in, for instance, the ruins of Babylon.

The Romans learned the art of brickmaking during their campaigns in Africa and introduced building in brick throughout their empire where stone was scarce. Roman garrisons built extensively in brick during the occupation of Britain and remains of their work survive, e.g. in London and Verulamium, near St. Albans. Roman bricks were very thin, and their area varied greatly from period to period. After the Roman withdrawal, there was little brickmaking or brickwork in Britain, and even on the continent of Europe the art declined until revived in the 12th century.

The Italian city states were among the first to appreciate the economy and convenience of building in bricks of standard

shape and size, and from Italy the revival of brick building extended to Spain, France, and the Low Countries. In the 14th century the Hanseatic League introduced brickmaking into Hull, and later the use of bricks extended throughout East Anglia, where building stone is scarce. France developed a high technique in brick building, and many of the English nobles returning from the French wars of the 15th century began using bricks for their homes. Notable examples of these are Tattershall Castle, Lincs; Lower Marney Towers, Essex; Hengrave Hall, Suffolk; and Oxborough Hall, Norfolk.

Thereafter, building in brick spread rapidly throughout England, and fine brickwork became typical of Tudor building; many beautiful examples remain, notably the original part of Hampton Court Palace, and the Lollard's Tower, Lambeth Palace. After the Great Fire of London, 1666, which destroyed thousands of timber and half-timbered houses, the City was rebuilt in brick.

The use of brickwork increased steadily from Tudor times, but its artistic development was interrupted in the 18th century when the Adams brothers revived stucco and applied it indiscriminately. During the development of railways in the U.K. in the first half of the 19th century, brick became an important engineering material (the majority of railway bridges and viaducts were built of it). At the same time, the industrial expansion of towns and cities in the U.K. led to the building in brick of masses of small houses. Towards the close of the 19th century there was a revival of good brickwork, and brick became a common material for even the largest buildings until the 20th century development of reinforced and stressed concrete.

Making Bricks

MANUFACTURE. Brickmaking machinery was introduced about 1860, and resulted in a more scientific selection of raw materials. These range from brick-earth of clay and sand or chalk, which can be used without processing, to hard clays or shale (hardened clay rock), which must be ground before use. The tough Staffordshire clay is used for making the pressed blue engineering brick of great strength and hardness. Fire-bricks for lining furnaces, etc., are made from the fire-clay found in coal measures. Ashes

are mixed with pure clay, such as London clay, to prevent bricks from warping during firing, and crumbly stone is added to Staffordshire clay. The colour of bricks depends on their chemical composition and the temperature at which they are fired, although chemicals are sometimes added to improve the colour from the architectural point of view.

Brickmaking by Hand

The simplest method of brick-making is to dig up the chosen clay in layers and spread ashes, sand, or other necessary additives on the top. The clay is then left to temper (weather) during the winter, being dug over two or three times to expose all the clay and mix in the additives. Tempering breaks down the lumps and renders the mixture more homogeneous and easier to work.

If the clay is very tough, or contains stones, it is reduced to a slurry, or thick liquid, in a circular wash mill with a central pier supporting arms from which heavy spikes and chains are suspended. Clay and water are filled into the mill, and as the arms revolve they harrow or break down the clay and mix it with the water. The resultant thick slurry is run off into troughs (called backs) to dry and temper, leaving the stones behind. Additives can be mixed into the slurry or spread over the clay in the backs and dug in as the clay dries.

Shales and very hard clays are pulverised in "edge-runner" mills. These consist of revolving circular steel pans with small holes in the bottom. Heavy rollers crush the lumps of clay or shale into small particles which pass through the holes in the bottom of the pans. The particles pass on to revolving sieves, from which the powder falls on to a conveyor while the oversize material is returned to the mill for further crushing.

Another method of brickmaking is by pug mill: this is a hollow cylinder with either a central revolving Archimedean screw or a central axis to which are attached knives set like turbine blades. Clay is fed in at the top of the cylinder and mixed with water; the screws or blades then force it through the cylinder, cutting it up again and thoroughly mixing it so that it will be easier to mould. When all air has been squeezed out of the clay it is kneaded to a dough-like consistency that makes it easy to handle.

If the bricks are to be made by hand, a lump of clay called a slot is squeezed into a mould, and the top is levelled by a wooden straight edge. The bricks are either *slop moulded*, when the moulds are constantly dipped into water to prevent the clay from sticking to them, or, to give them a better finish, *sand-moulded*, when the inner faces of the mould are covered with sand. The moulded bricks are laid on wooden pallets for preliminary drying. A good moulder and a boy can produce 1,000 bricks a day. Ornamental bricks and facing bricks of special textures and colours are usually hand-moulded.

Mechanical Methods

The three major mechanical methods of brick moulding are the plastic or wire-cut, the stiff plastic, and the semi-dry process. In the first the clay is mixed to a fairly wet consistency in the pug mill, which forces the clay in a continuous strip through a nozzle the shape and size of a cross section of the brick. The clay strip passes over rollers on to a cutting table where it is cut by wires into separate bricks. There are also automatic machines which cut the bricks and space them apart on pallets. Although hard-wearing wire-cut bricks are seldom used for facing because of their rough surfaces; they can be made suitable for use as facing bricks by re-pressing them in moulds when they have dried to what is called leather hardness.

The stiff plastic process uses clays which can be ground and sieved to the consistency of garden soil. The clay passes through a mixer, where either water or very dry clay is added to give the proper consistency, and then to a pug mill which feeds the brickmaking machines. These press the clay into approximate brick size and then pass the clots to moulds where they are pressed to final size and shape.

The semi-dry process uses hard clays, ground to an almost dry powder. This is passed through a mixer, where water or other materials are added as necessary, and then by spiral conveyor to the moulds, where it is subjected to four successive pressures each of 80 tons.

Stiff plastic and semi-dry bricks can go straight to the kiln; but hand-made and wire-cut bricks require preliminary drying. Hand-made bricks are often dried by arranging them in thick, open-

jointed walls covered with thatch, or by stacking them in open-sided sheds. Wire-cut bricks are either conveyed on their pallets through a drying tunnel which becomes progressively warmer, or are placed in drying chambers of controlled humidity.

Hand-made stock bricks are usually fired by building them in a clamp containing perhaps 1,000,000 bricks, and heated by a coke fire at the base. The bricks themselves contain ashes which help combustion. This method results in 30–40 p.c. of wasted bricks, but saves the cost of a kiln.

The most popular kiln in large brickfields is the Hoffman, a circular arrangement of intercommunicating cells controlled by dampers. Firing is done in the cell containing the bricks that have been longest in the kiln, and the hot gases travel round until they reach the most recently filled cell.

Firing can also be done in a tunnel kiln, which is similar to the tunnel drier. The bricks travel on trucks from the cool entry to the firing point, and then progressively out. Both the Hoffman and the tunnel systems are economical of fuel and labour.

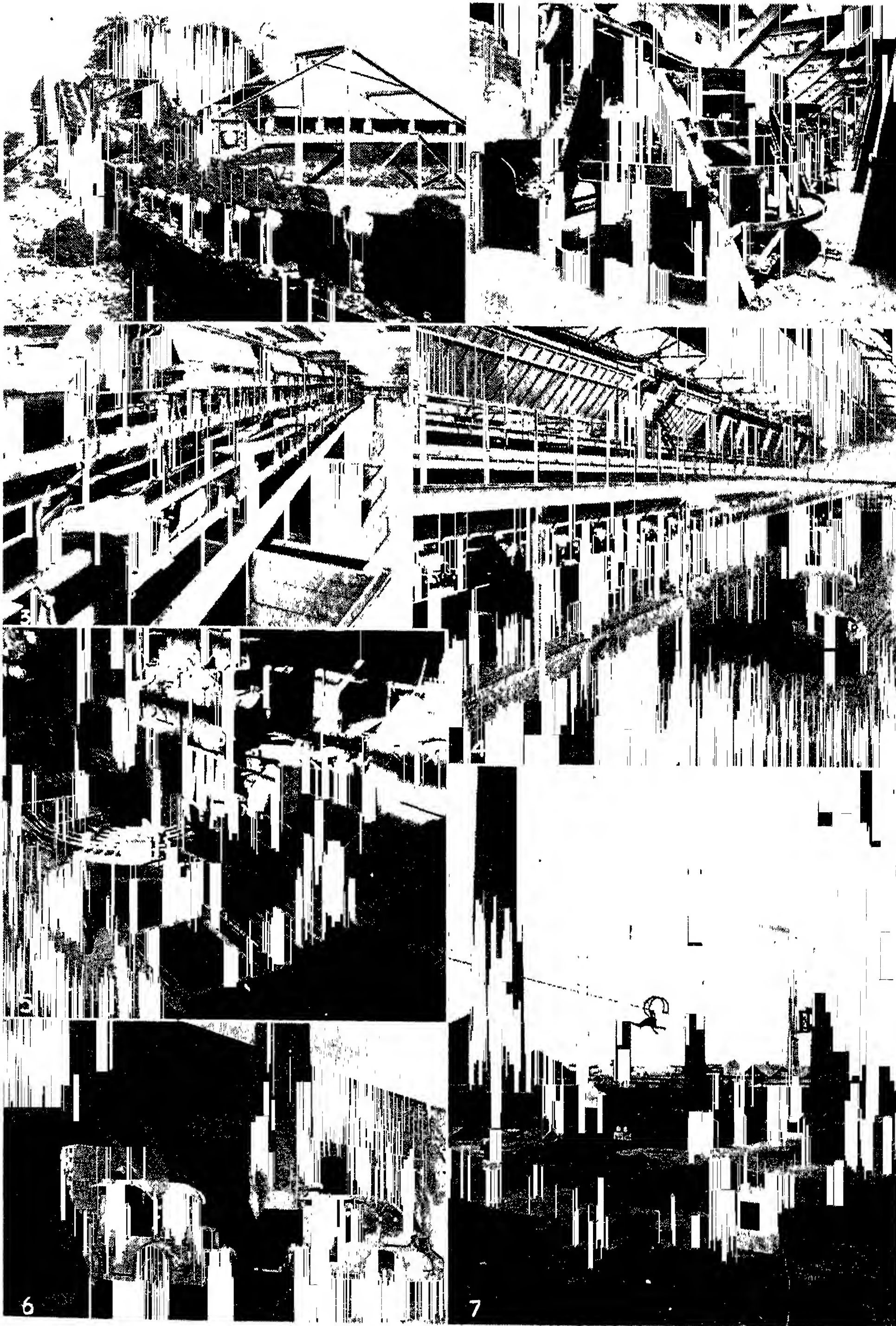
The Scotch batch kiln is generally used in small brickworks. The temperature of firing, which varies between 800° and 1,500°C., is controlled by indicating and recording pyrometers.

Standard Measurements

The standard British brick is $8\frac{1}{4}$ ins. long, $4\frac{3}{8}$ ins. broad, and $2\frac{7}{8}$ ins. thick. Allowing for mortar joints, this means that a brick occupies a space 9 ins. by $4\frac{1}{2}$ ins. by 3 ins. Glazed and coloured bricks are made by dipping the shaped bricks into an appropriate slurry or slip before firing.

(For the various methods of laying bricks, see Bonding.)

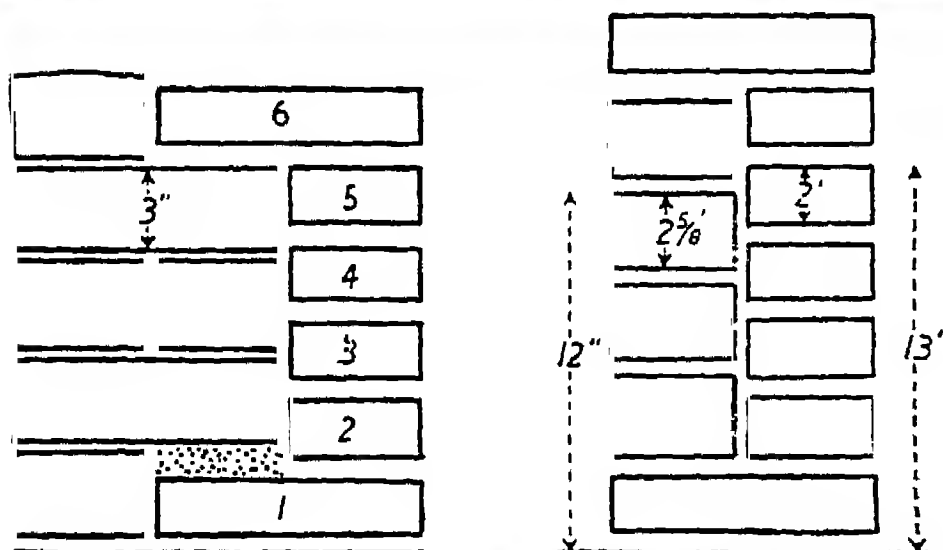
BRICKWORK. The early Sumerians made good bricks and the ruins of Babylon (*q.v.*) contain the remains of many fine brick structures, *e.g.* the Ishtar gate, built by Nebuchadnezzar II. It is probable that the face of each individual brick was moulded to shape and polished before it was fired. The tradition of good brickwork continued in the area, a very fine example being the so-called "arch of Chosroes," dating from the 6th century A.D., at Ctesiphon (*q.v.*), 25 m. S.E. of Bagdad. The arch axis is a true catenary curve, the optimum shape for an arch, proving that the builders understood statics. The arch was built



1. Clay and overburden being carried from the pit by conveyor belt. 2. Grinding machines and pans in which the clay is broken up before screening. 3. Screened clay being carried and distributed to the brick presses. 4. Inter-works fork-lift trucks removing moulded bricks from the presses. 5. Roller conveyors

Courtesy London Brick Co., Ltd.
removing formed bricks from the moulding presses. 6. Right: fork-lift truck delivering "green" or newly-moulded bricks to the firing kiln. Left: fork-lift truck removing newly-fired bricks from the kiln. 7. Roof of kiln showing in foreground pyrometers which record the temperature inside the kiln during the firing

BRICK MECHANISED MANUFACTURE FROM CLAY TO KILN



Brick. Diagrams showing different methods of working 2-in. bricks together with thick ones

without false-work. Each successive course of bricks was laid on a horizontal bed, but protruded a little more into the room than the one below, so that the walls curved inwards to meet at the crown or top of the dome. This system survives for brick arches in the Middle East; elsewhere the courses in an arch are laid on inclined beds of false-work radiating from the centre.

The colour of the bricks and the type of bond give a wall its character. Some architects use facing bricks 2 ins. or 2½ ins. thick to obtain a special effect. Pilasters, string-courses and cornices, panels and outstanding quoins or corners give variety to the surface. Such work is always done in "gauged work." This is made of soft bricks called rubbers cut to precise shape, and set out with very thin joints. Ornamental niches and arches are a feature of Islamic work. Carving done by "axing" or carving the bricks in situ is another type of ornamentation. Islam forbids the representation of living creatures, but the Arabic countries show some fine geometrical designs. Diapers and patterns were common in French medieval castles; they are made by using special headers of a different colour from the main brickwork to make a figure. This form had some popularity in 18th-century England, and is occasionally still used.

Up to the end of the 19th century the mortar used in brickwork was a mixture of sand and lime. Round about 1900 cement

"pointed" in coloured mortar to obtain a special effect.

In steel-framed and reinforced concrete buildings, much used for factories, the brick panel walls carry no load and are merely clothing or "cladding" for the building.



Brick. Ornamental brickwork used in the loggia of a 20th-century house with rough-cast walls

was substituted for lime, but the mixture was found to work harshly, and special masonry cements or a mixture of lime and cement came to be used. The joints showing on the face of the wall are sometimes raked out to a depth of half an inch and

Brick Earth. Loamy clay deposit of Pleistocene or Recent geological age. It is well developed in south-east England, and is used for brickmaking. Occasionally it contains traces of human remains and bones of other mammals.

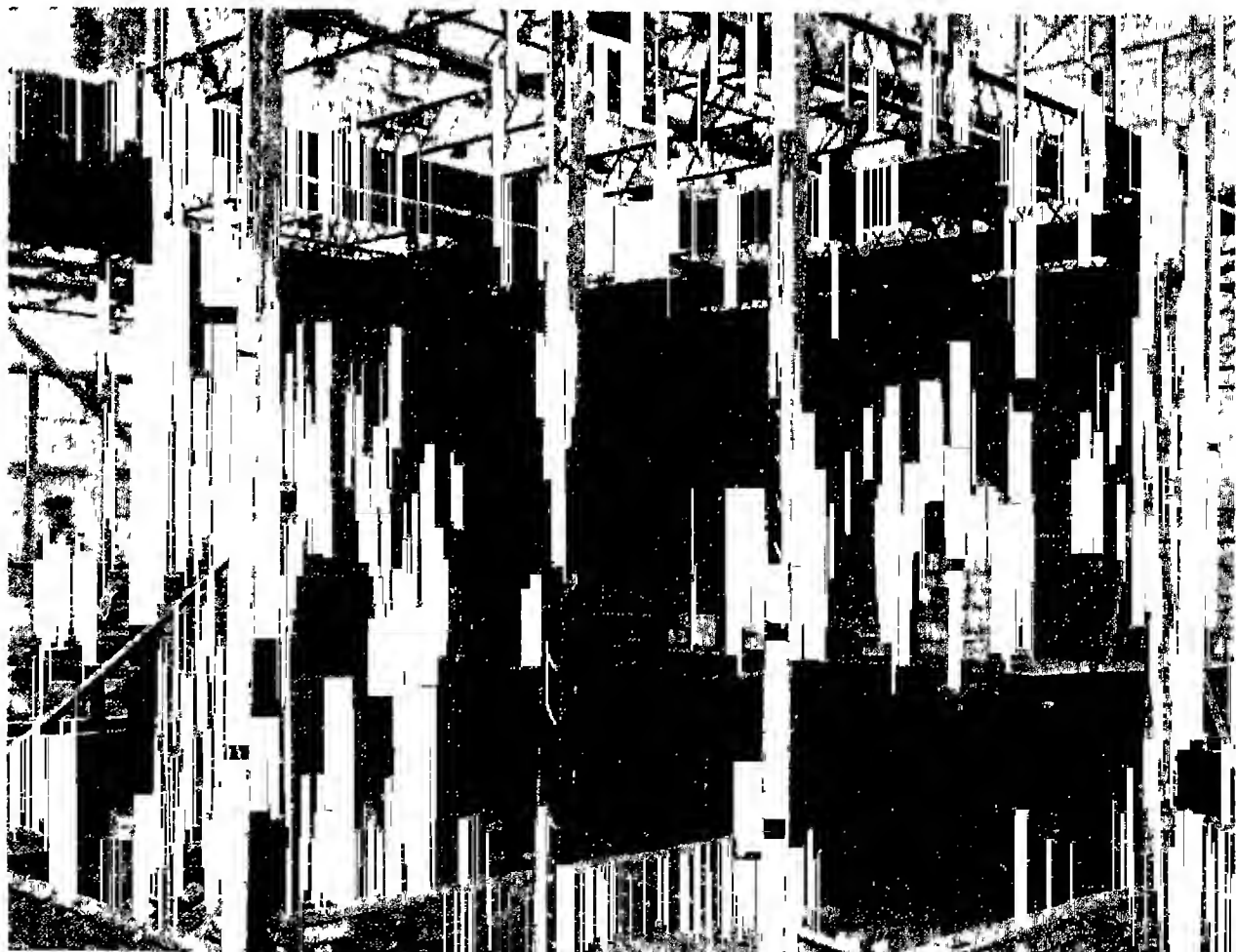
Brickfielders. Hot north winds from the interior experienced in S. Australia. Sometimes they blow for a few hours, sometimes for days, and owing to their heat and dryness are often destructive to crops. They are caused by the movement of dust-laden air from the heated desert interior towards cyclonic systems passing along the margins of the continent. They are called brickfielders from the red dust they carry.

Bride. Word of Teutonic origin used for a woman about to be married or just married. From it a number of other words have arisen, all connected with the ceremony of marriage, in which the bride is regarded as the central figure. The bridegroom is the man or husband of the bride and the bridesmaids those who attend her. Bride cake and bride ale, corrupted into bridal, are other words derived from bride.

In the North Riding of Yorks, the dialect word bride-ale is still used of the drink given to the wedding party after the ceremony.

Bride. Variant form of Brigid, saint of Ireland. It was the form commonly used in England, where many churches, notably S. Bride's, Fleet Street, London, received this dedication.

Bride of Lammermoor, THE. Novel by Sir Walter Scott, forming, with A Legend of Montrose, the



Brick. House built with a steel framework faced and lined with bricks This method is extensively used in the construction of factories

Photo, Ministry of Works, Crown copyright

third series of *Tales of My Landlord*. It was based on a tradition of the family of Dalrymple of Stair, and, dictated in illness, was published in June, 1819. There is much quiet humour in the early part of the book, but the climax is tragic and horrifying. Donizetti's opera *Lucia di Lammermoor*, 1835, is founded on the novel, as was a play called *Ravenswood*, by H. C. Merivale, produced by (Sir) Henry Irving in 1890.

Brides in the Bath. Victims of a series of murders by George Joseph Smith, born 1872, executed Aug. 13, 1915, at Maidstone. They were women inveigled into "marriage" and then murdered either for their money or for the sum for which at Smith's suggestion they had insured their lives. (Smith had gone through innumerable marriage ceremonies before he took to murder.) Three victims out of an unascertained number were revealed to the Old Bailey jury:

(1) Bessie Constance Mundy, of independent means, the victim on whose account Smith actually suffered death. She was married to Smith, calling himself Williams, at Weymouth, Aug. 26, 1910, and made a will in his favour; she died at Herne Bay, July 13, 1912—drowned in her bath. The delay in her death is explained by the fact that Smith deserted her shortly after the marriage, returning after 18 months.

(2) Alice Burnham, a nurse, to whom Smith was "married" under his own name at Portsmouth, Nov. 4, 1913. He appropriated her savings and induced her to insure her life. She was drowned in her bath at Blackpool, Dec. 12, 1913. A coroner's jury returned a verdict of accidental death.

(3) Margaret Elizabeth Lofty, "married" to Smith, calling himself Lloyd, at Bath, Dec. 17, 1914, drowned in her bath at apartments at Highgate, N. London, Dec. 18, 1914.

Each bride went to her bath, the bridegroom meanwhile constructing an elaborate alibi. The victim failed to re-issue from the bathroom, to which Smith (or Lloyd or Williams) presently led a search-party to find his wife drowned.

Bernard Spilsbury gave evidence for the prosecution and Edward Marshall Hall defended Smith. How Smith drowned his victims was never established. Marshall Hall maintained that he did so by hypnotism.

Bridewell. Originally a well, dedicated to S. Bride, or S. Brigid, near what is now New Bridge Street, Blackfriars, London. Later covered by a pump, it gave its



Bridewell. The building destroyed by the Great Fire. It was in turn palace, prison, and penitentiary

name to a palace, a parish, a church, and a prison. Tradition tells that a Roman fort and a Saxon palace stood near the site in turn; also that Montfichet, a follower of William I, built a tower on it. Henry VIII granted the ground (then apparently an orchard and gardens) to Wolsey in 1509; later Henry built himself a palace here, and redecorated it for the reception of the emperor Charles V, who was lodged at Blackfriars. The third act of Shakespeare's *King Henry VIII* is laid therein. It later housed various foreign embassies.

Given to the City by Edward VI as a refuge for the homeless, the palace became "a house of correction and a house of occupation"; under Elizabeth I it was made also a place of detention for heretics of many persuasions. It next became a penitentiary with a department for idle apprentices.

Rebuilt several times after 1666, it was pulled down 1863-64, leaving only the hall, treasurer's house, and offices, with a common room and cells for refractory apprentices. As the first reformatory in England, Bridewell gave its name to reformatories generally. German bombing in 1940 left the remains of the old building a ruin.

Bridge. Structure that carries road, railway, or canal traffic over a river, a road, a railway, or a canal. The problem of crossing rivers too deep to ford is as old as man's ventures in travel, and the various solutions which have been evolved mark the development of science; for the bridge-builder is always dependent on the materials available and the contemporary knowledge of physical science. The solutions can be divided into five main types of bridge—the beam, the suspension, the arch, the truss, and the floating bridge.

BEAM BRIDGES. The earliest bridge was probably a large tree which fell across an unfordable river. This was the most ele-

mentary form of beam bridge, and was later built of shaped logs and planks. The dimensions of the early log-and-plank bridge related to the distances to be crossed rather than to the loads imposed on it. Later, bridge-builders learned to calculate the stresses induced in a beam by loading it. The chief of these stresses are: tension

at the bottom; compression at the top; and shear through the body. This can be demonstrated visually by supporting a bar of rubber at each end and loading it in the middle. The bottom will lengthen—tension; and the top shorten—compression. In the middle there will be neither tension nor compression—a plane called the neutral axis. The parts in tension and compression are prevented from sliding on each other by the cohesion of the body of the bar or beam, and the stress there is called shear. If a beam is continuous over three or more supports there will be, at each intermediate support, tension at the top and compression at the bottom, as well as the reverse between the supports. Continuous beams are stronger than simply supported beams.

If the beam is firmly held at one end and unsupported at the other it is a cantilever, and there will be tension at the top and compression at the bottom. These are the fundamental laws of loading which apply to all kinds of beams and trusses.

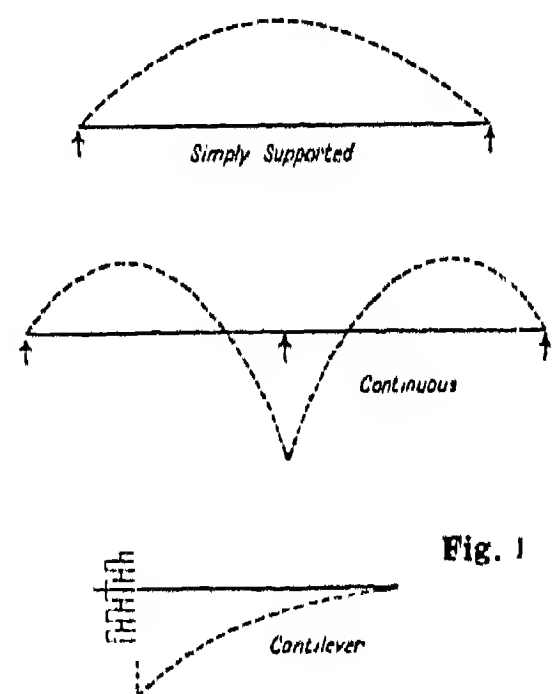


Fig. 1

Fig. 1 shows diagrammatically how the compressive stress varies in intensity and location in different types of beam. The distance between beam and curve shows the intensity of the compression. There will be an equal tension on

the other face of the beam. It is good engineering practice to make a beam or truss deepest where the stress is greatest; and the side view of a bridge will often show whether it is simply supported, continuous, or cantilever. In the Forth Bridge, (4) in p. 1422, the massive cantilevers are very deep over the foundations, but rapidly get shallower. The suspended spans between them are simply supported, and are deeper at the middle than at the ends.

Depth is more important than breadth in the strength and the rigidity of a beam: a plank on edge is much stronger than the same plank laid flat. In fact, the strength is approximately proportional to the square of the depth, and the rigidity to the cube; whereas both properties are directly proportional to the breadth. Since the main tensile and compressive stresses are concentrated in the top and bottom faces, a great deal of the central part could be removed without impairing the strength, leaving something in cross section like a capital I. (This is not very practicable in timber, but it is the principle of the rolled steel joist—see below.)

Stone is not an efficient material for beam bridges, as it is weak in tension and seldom obtainable in suitable lengths. One very early form of stone beam bridge is the Post Bridge on Dartmoor, (1), p. 1421, believed to be contemporary with Stonehenge. It consists of three granite slabs, one 15 ft. long by 6 ft. broad, resting on dry stone piers.

Early Timber Bridges

Because of its availability and ease of working, timber was the main material for early bridges. A timber bridge resting on brick piers was built over the Euphrates at Babylon in 780 B.C., and the bridge which Horatius kept was the timber Pons Sublicius which crossed the Tiber on wooden piles. In 55 B.C. Julius Caesar built a timber bridge on piles over the Rhine in 10 days. Timber is still extensively used in the U.S.A. and Canada for railway bridges, although the fire hazard is leading to their gradual replacement by steel structures.

Beam bridges of the early 19th century were often of cast-iron. But as cast-iron is weak in tension and brittle, it was supplanted by wrought-iron, and then by steel. Rolling mills produce rolled-steel joists in standard sizes, with the steel concentrated in top and bottom flanges, connected by a

vertical "web" (fig. II, A). These are suitable for spans up to 20 or 30 ft. Beyond that length girders built of plates and angle-irons riveted together are used (fig. II, B). They are now rarely used for spans of more than 80 ft.; but the Britannia Bridge over the Menai Straits, built by Stephenson in 1850, is in the form of a box girder with main spans of 460 ft. It consists of two parallel web plates a few feet apart connected by continuous flange plates above and below, the whole forming a box through which the railway passes.

In the 20th century reinforced concrete became an important material for beam bridges as it is attractive architecturally, is permanent, and is resistant to corrosion. Concrete bridges are sometimes built as cantilevers with simply supported spans suspended between them. The second Waterloo Bridge, (1), p. 1422, is of this type, but for architectural reasons the curves simulate an arch, and the depths at the ends of the suspended spans are greater than required by the stresses. The Montrose Bridge, (2), p. 1422, is also of this type, though it resembles a suspension bridge.

A beam can be made stronger without altering the flange area by increasing the depth. This means more material in the web, much of which is not required for the shear, imposes an extra dead load on the bridge, and is expensive.

TRUSSES. In the truss bridge, the solid web is replaced by vertical and diagonal members which, with the top and bottom flanges, or chords, form a series of triangles. This is the principle of triangulation: if three members are connected by pin joints to form a triangle that shape cannot be altered but remains a rigid frame.

The truss obeys the laws of the beam, with tension and compression in the chords, but the shear in the web plate is replaced by tension in some web members (the ties) and by compression in others (the struts). The openwork truss can be made very deep and strong, yet light, and is generally used for spans exceeding 100 ft.

The principle of the truss was evolved by an Italian architect, Andrea Palladio, in the 16th century. Leonardo da Vinci also made sketches showing triangulation. Although both da Vinci

and Palladio understood the mathematics of the truss, the principle of the truss was not applied until Hans Grubenmann in 1760 built a timber truss 300 ft. in span near Baden.

The early 19th-century bridge-builders made extensive use of trusses, either of timber or of composites of timber chords and cast-iron struts or wrought iron ties. By the

middle of the century, timber was giving way to wrought iron; later steel was used. Designers of the early trusses had no uniform method for computing truss stresses. Every engineer had his own system, and this often led to dangerous designs; but some remarkable truss bridges were constructed, e.g. Brunel's Saltash Bridge over the Tamar, built in 1849, which has two spans of 455 ft., and still carried heavy railway traffic more than a century later.

The design of trusses owes much to the work of Telford, Fairbairn, and Hodgkinson, and when Whipple of the U.S.A. in 1847 and Bow of Scotland published books on the fundamental mathematics of the truss, design became simpler and safer.

The three main types of truss are: the Warren, used for short spans, in which the chords and web-members form a series of equilateral triangles; the Pratt, used for spans of up to 250 ft., in which the struts resemble a series of capital N's; and the Petit, used for spans of up to 750 ft., which is a Pratt truss with sub-ties and sub-struts added. The longest truss bridge built up to 1955 was the continuous Petit truss-bridge at Sciotoville over the Ohio, with 755 ft. spans.

Trusses are often used for cantilever and suspended span bridges of long spans. The 1,750 ft. main spans of the Forth Bridge, (4), p. 1422, were not exceeded in length until the 1,800-ft. span of the Quebec Bridge, (3), p. 1424, built in 1917.

The Bailey Bridge was designed for use by the military, but its simplicity and ease of erection have given it many peace-time uses, either for permanent bridges in difficult country, or as temporary bridging for engineering projects.

Much Bailey bridging and many pontoons were used on the construction of the natural gas pipeline from Sui to Karachi in

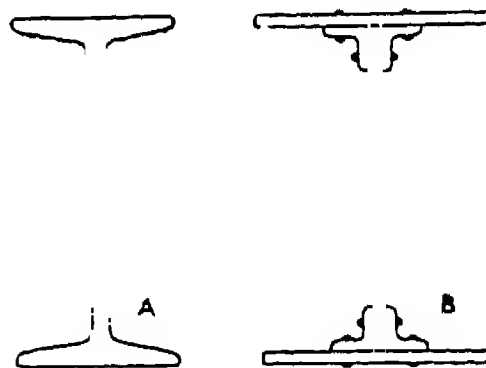
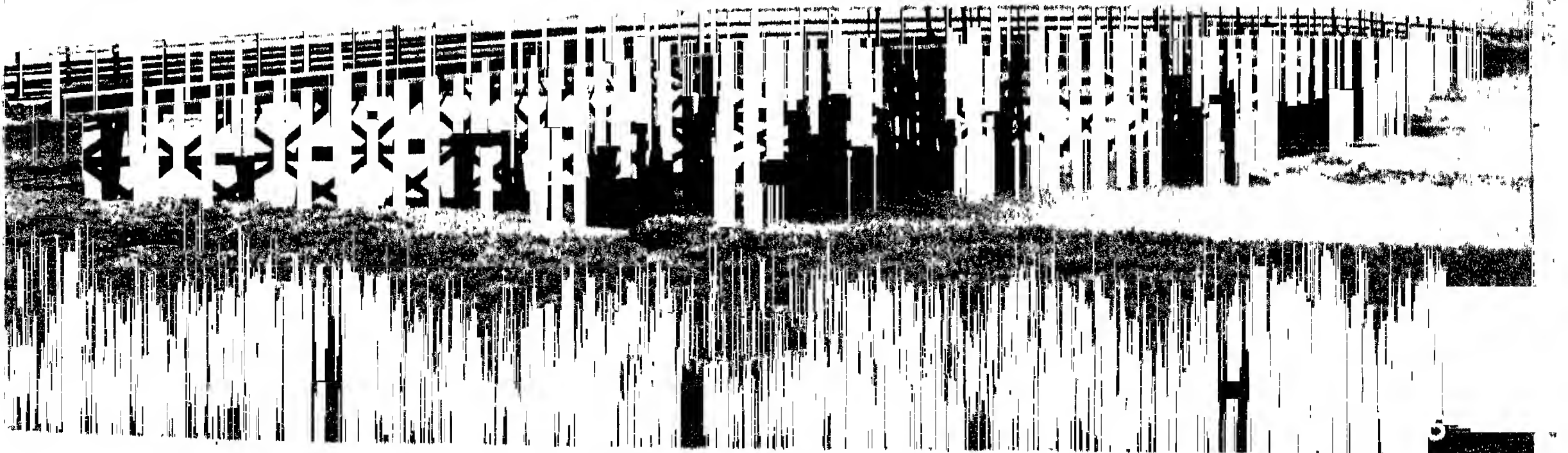
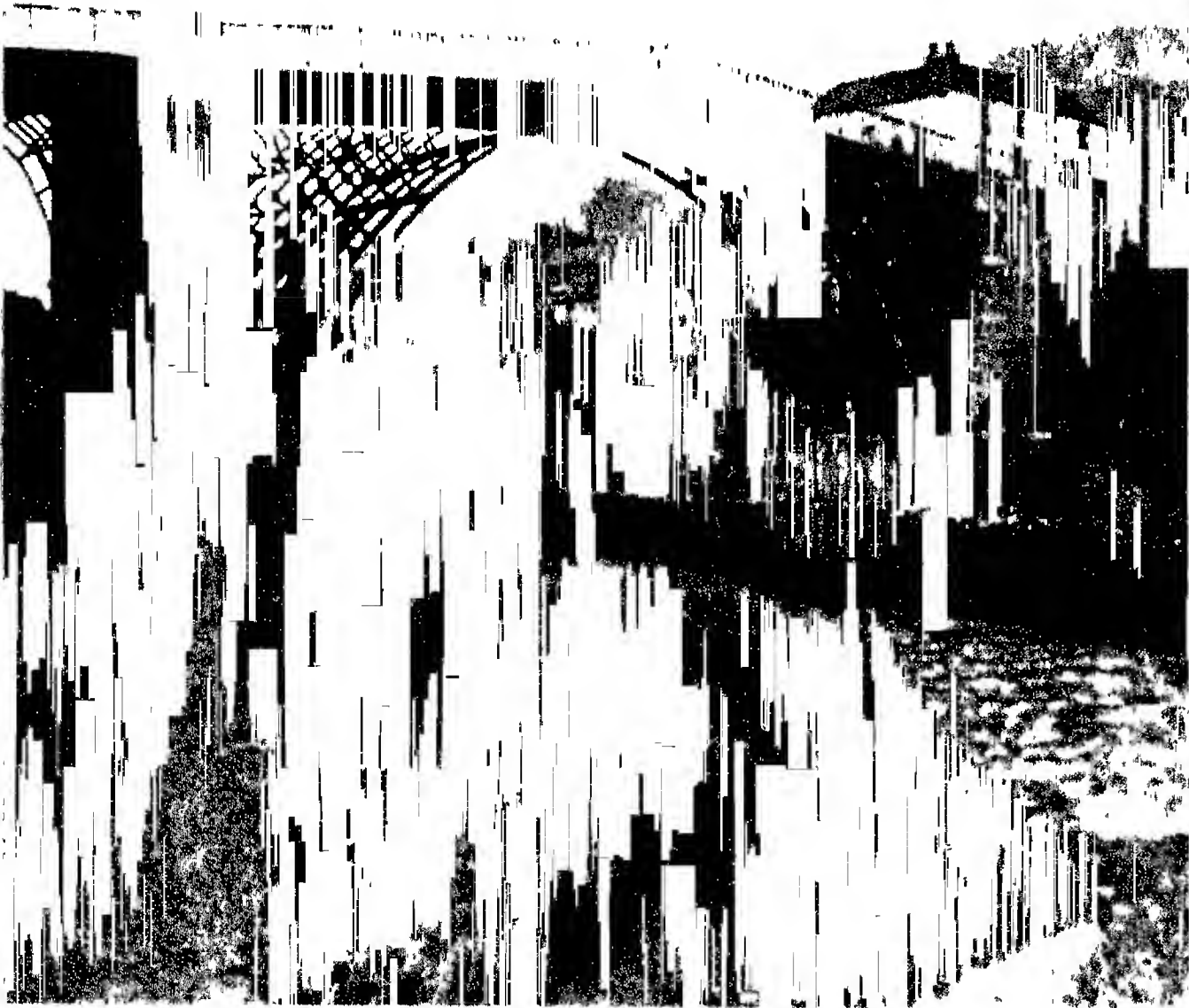
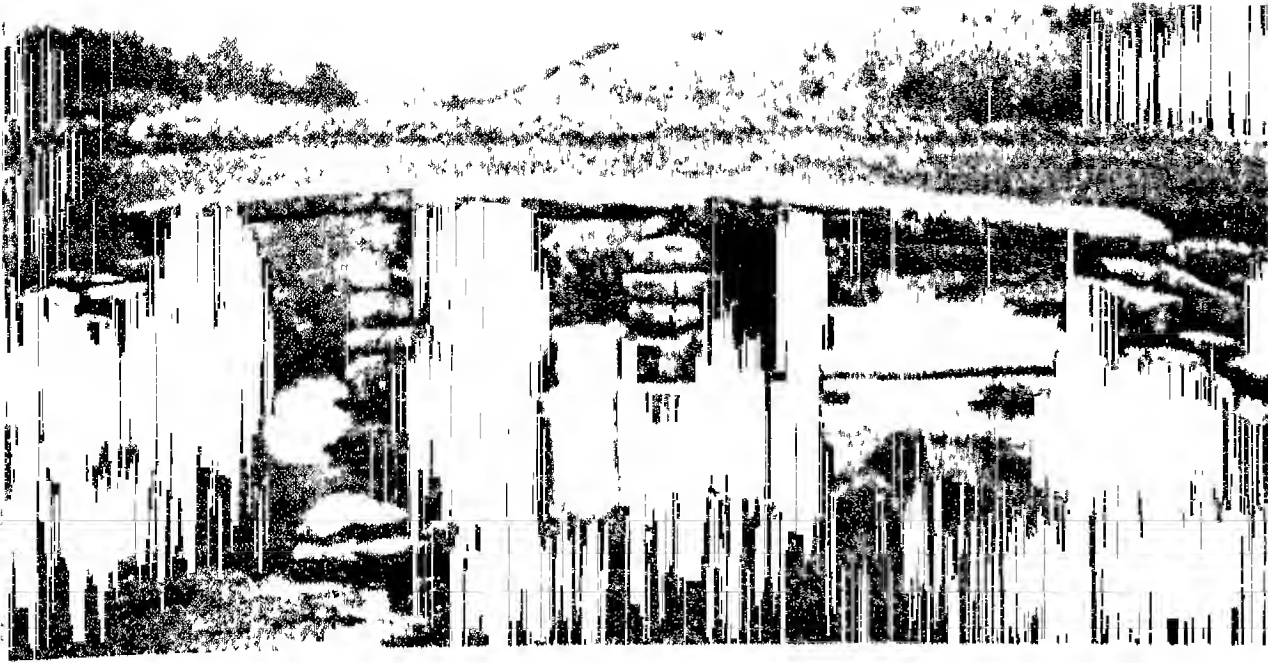


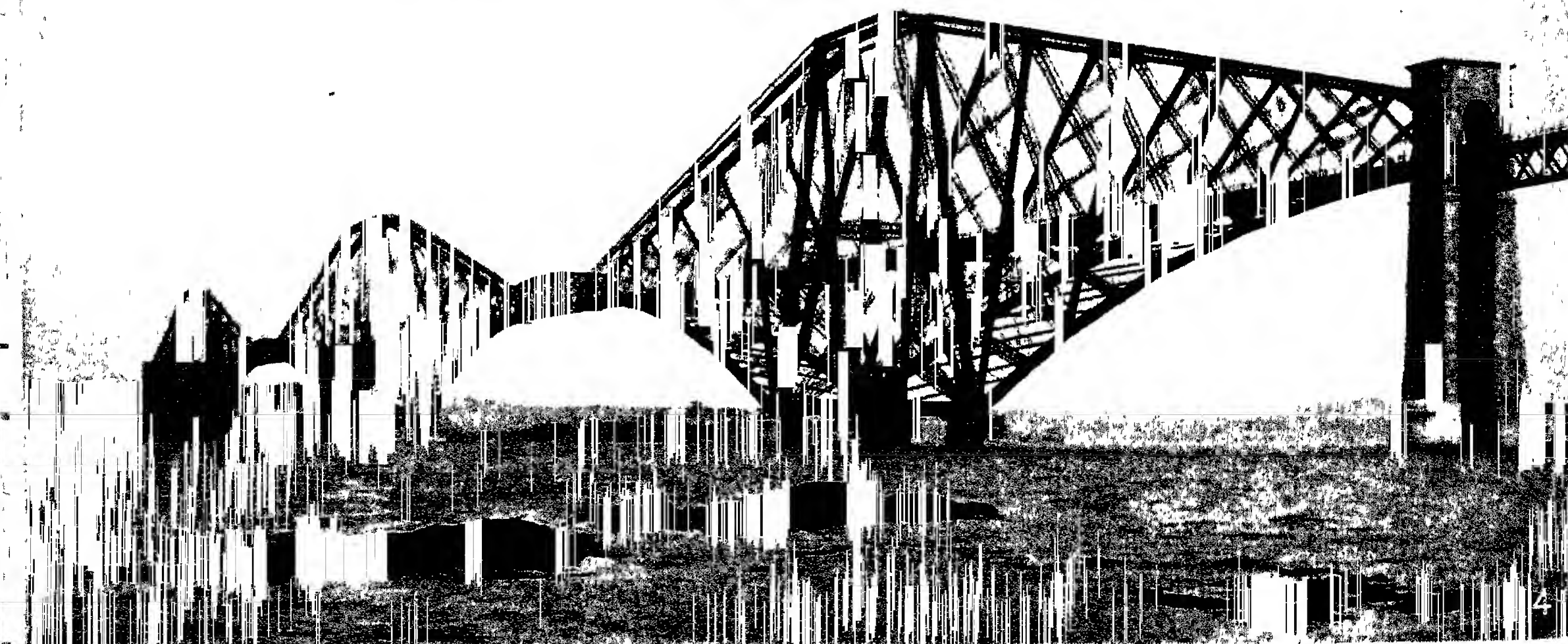
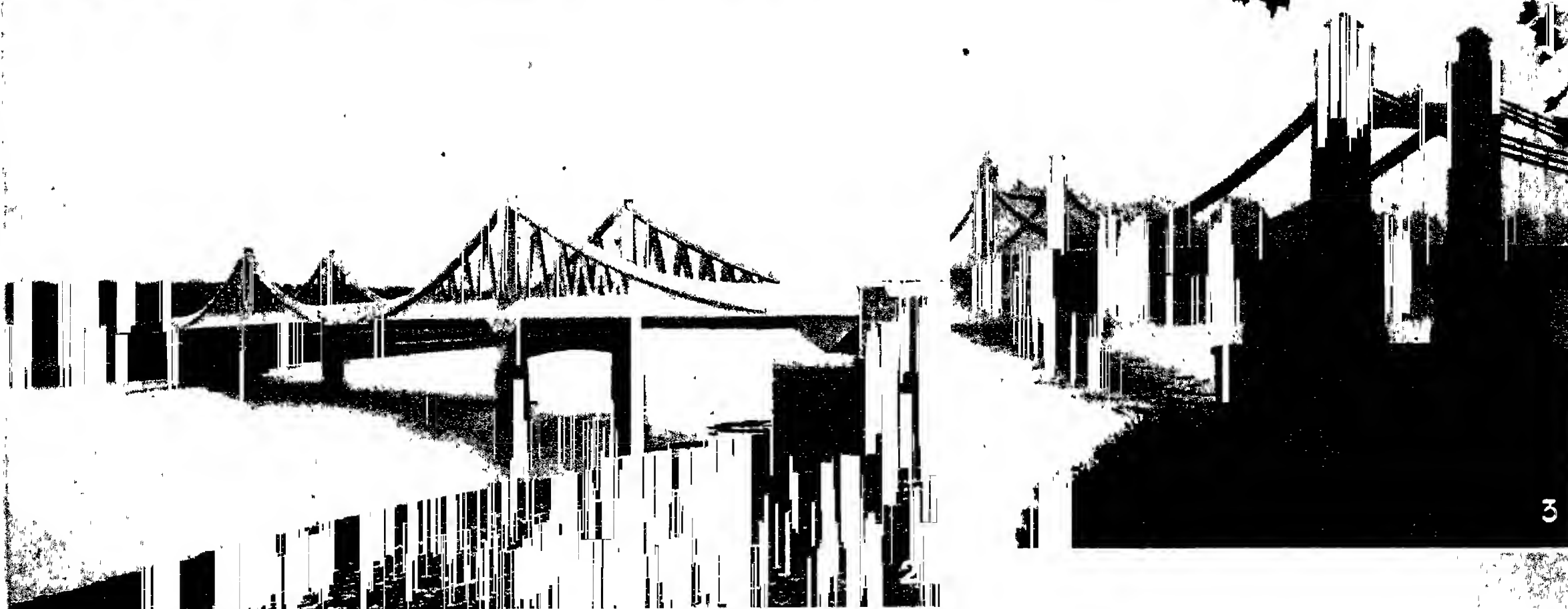
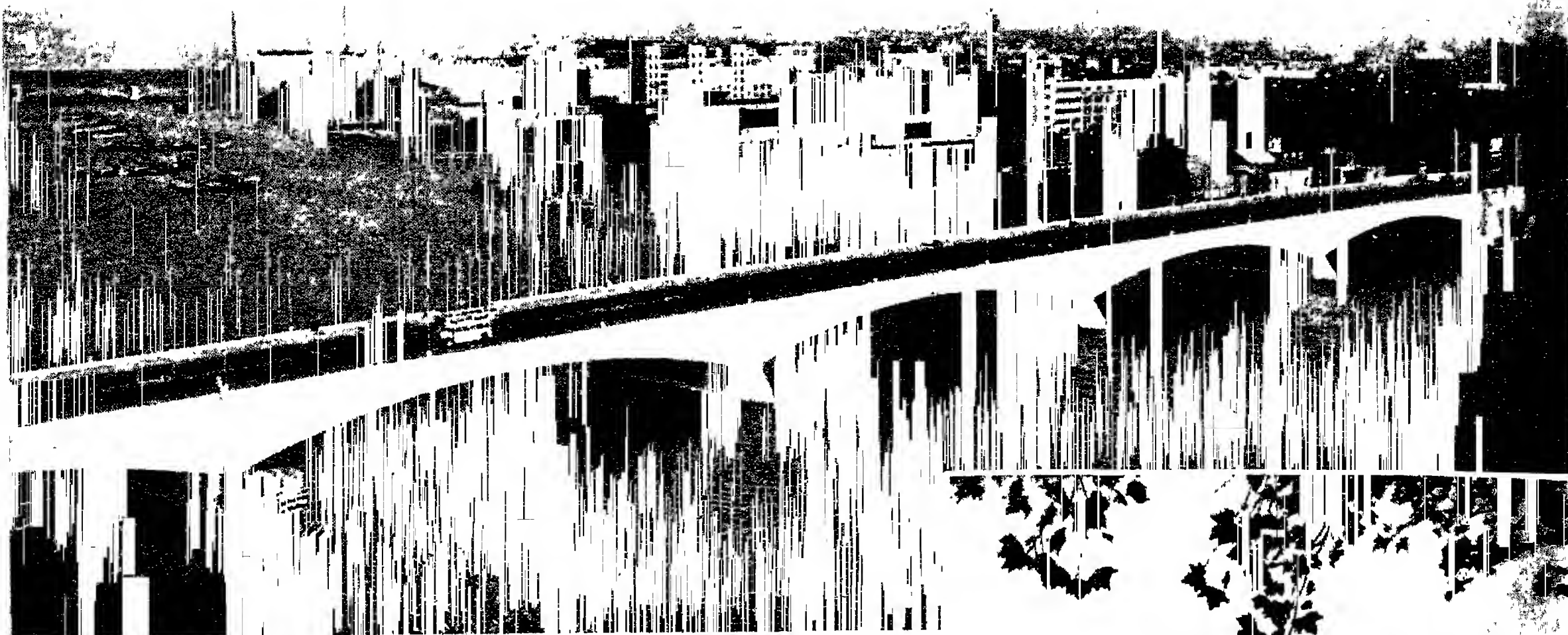
Fig. II



1. Old Post bridge, Dartmoor, a single stone slab with rough stone steps on either side. 2. An example of spandrel-filled arches: Greyston bridge, Dartmoor. 3. First iron bridge in the world, erected in 1779 at Coalbrookdale, Shropshire. 4. Twizel bridge, over which the English army crossed the river Till into Scotland on its way to Flodden Field. 5. Old Shoreham bridge, built entirely of wood across the bed of the Adur, Sussex

BRIDGE: SOME HISTORIC AND OLD FORMS OF CONSTRUCTION

Photos, 1 and 2, Herbert Felton; 4, B. U. Clayton

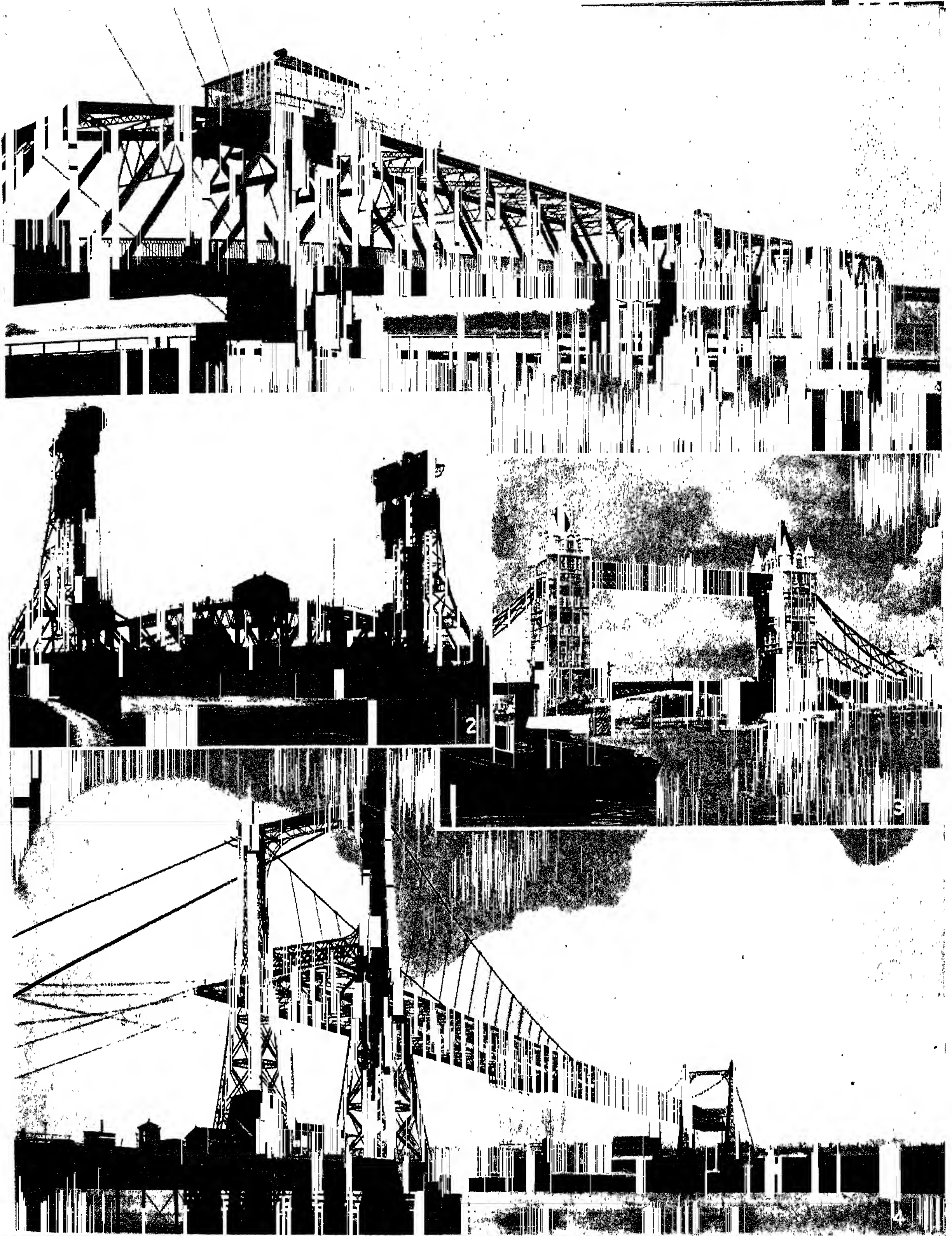


1. The new Waterloo bridge, over the Thames, London, as it appeared at the time of its official opening in 1943: its five arches are of reinforced concrete, the whole design being of the cantilever and suspended type. 2. Montrose bridge over the S. Esk, Angus, Scotland, another bridge of the same type and material, though

resembling a suspension bridge in appearance. 3. Chelsea old suspension bridge, London, opened in 1888, and replaced in 1935: length, 915 ft. 4. An engineering wonder, the Forth bridge, Scotland, designed by Sir Benjamin Baker and Sir John Fowler, opened 1890: its three steel towers are 360 ft. high: it carries two rly. tracks, and is over $1\frac{1}{2}$ m. long

BRIDGE: FOUR CONTRASTING EXAMPLES IN ENGLAND AND SCOTLAND

Photos 3, A. G. Paterson; 4, Donald McLeish

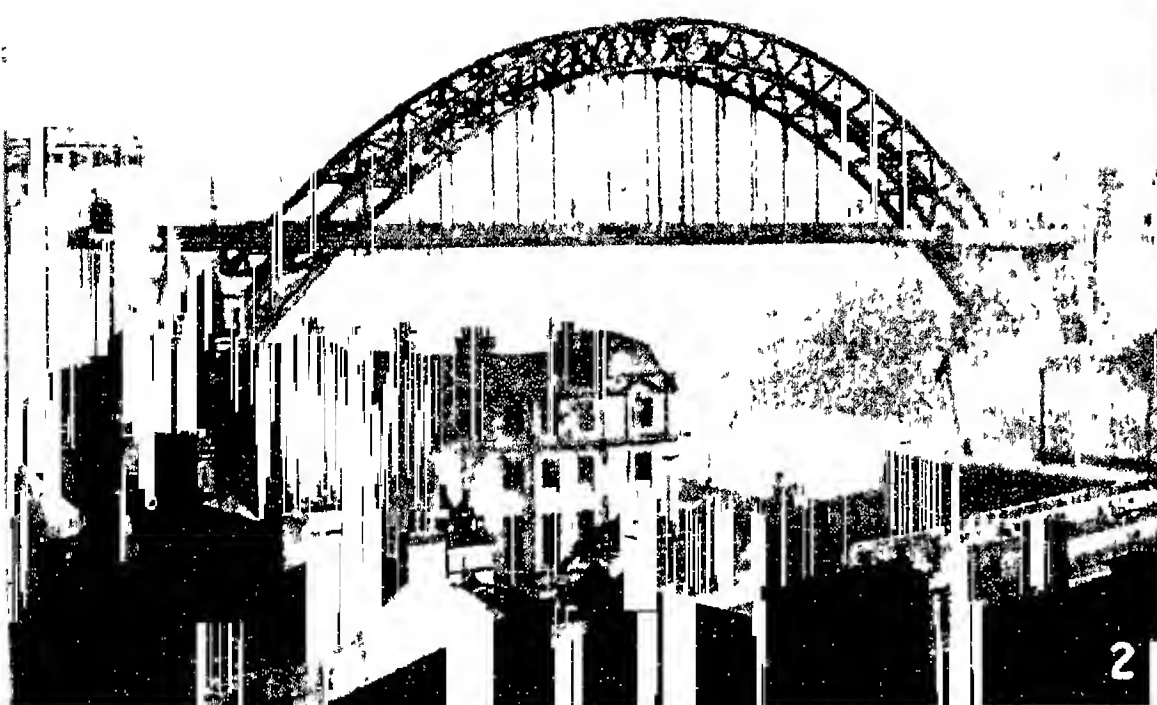
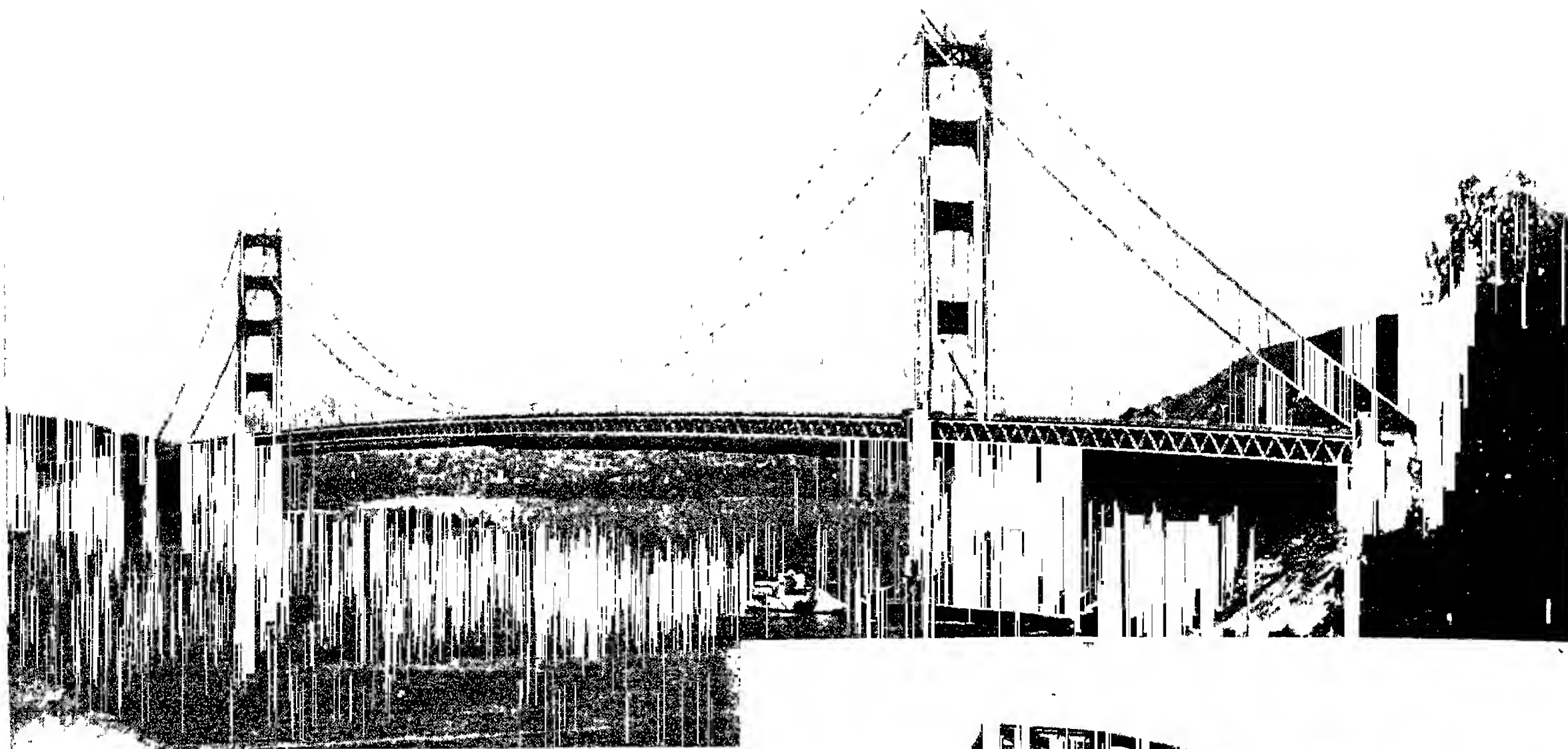


1. Boothferry bridge, Yorkshire, a swing bridge of a type usually constructed across the narrow navigation channel of a wide river. 2. In congested dock areas where river traffic is continually passing, a lift bridge, such as this Tees-Newport bridge, is the most suitable design. 3. Tower bridge, London (1894), a design of two cantilever bascules

in the centre raised by counterweights and hydraulic machinery; they can be raised in 1½ minutes. 4. Widnes-Runcorn transporter bridge crossing the river Mersey and Manchester Ship canal, an important link between two large factory areas, with a span of 1,000 ft. The suspended road-platform travels across like a ferry

BRIDGE: SWING AND LIFT TYPES IN INDUSTRIAL AREAS

Photos, 2, For: 3, Sport and General; 4, Valentine



1. Golden Gate bridge, linking San Francisco with its Redwood Empire counties, the longest and highest single-span suspension bridge in the world: the centre span exceeds 4,000 feet in length. 2. Tyne bridge, connecting Newcastle-upon-Tyne with Gateshead: this fine structure was opened by George V in 1928. 3. Quebec bridge, over the river St. Lawrence, completed 1917: built of structural steel, it is one of Canada's largest bridges, having a span of 1,800 ft. 4. Sydney Harbour bridge (1932) with an arch span of 1,650 ft., exceeded only by the Bayonne road bridge, New York (1,652 ft.): it carries both road and railway, connecting Dawe's Point to Milson's Point

BRIDGE: ENGINEERING MASTERPIECES BOTH OLD AND NEW

Photos. 1, E.N.A ; 2, Topical; 3, Associated Press; 4, Fox

1954-55. When the floods of 1953 destroyed the water main which supplied S. Beveland and Walcheren, the Dutch engineers erected a double triple Bailey bridge to carry a new main. Though the bridge was two-thirds submerged at full tide, it maintained its efficiency.

ARCH BRIDGES. Apart from the Post Bridge already described, the stone arch is the oldest type of bridge that has survived, for the early timber bridges have decayed. The Romans were the first to develop the arch bridge on any important scale, and their stone-cutting technique was such that many of their arches were built without mortar, while the voussoirs (the wedge-shaped stones forming the arch) fitted as closely as if they had been ground together. For foundations and piers they used a hydraulic lime which set under water.

The first recorded Tiber bridge was built in 178 B.C. Another, the Pons Fabricius, with two 80-ft. spans, was built in A.D. 162, and as the Ponto Quattro-Capi still carries traffic. The Romans built many fine stone-arched bridges, and at least one great timber arch, Trajan's bridge over the Danube, A.D. 104, with twenty 180-ft. arch spans. The arches were built up of pieces of timber, in much the same way as is the modern steel-braced arch. As an arch exerts horizontal as well as vertical pressure, and as the Romans did not have the necessary technique or equipment for building foundations on poor soil, many of their bridges collapsed.

After the fall of the Roman Empire few bridges were built in Europe until construction was revived in the 12th century by a monastic body called the *Fratres Pontis* (brothers of the bridge).

Old London Bridge was begun in A.D. 1176 by one of these brothers, Peter of Colechurch, whose body was buried in one of the piers. Many stone and timber arches were built thereafter, but they were designed by rule of thumb until Newton explained the mechanics of the arch. The construction of roads and railways in the late 18th and the 19th centuries entailed the building of many arches in stone and brick. Amongst outstanding examples were Smeaton's arches at Berwick, and those of Rennie for the original Waterloo Bridge (*q.v.*). After the introduction of steel and concrete, which are stronger and cheaper as materials for bridges, new stone arches were rarely built.

The first metal arch was the bridge over the Severn at Ironbridge, near Coalbrookdale, (3), p. 1421, built by Abraham Darby in 1779. Two cast-iron ribs of 100 ft. 6 ins. carry the roadway. The ribs were cast in halves, and were joined at the crown by a hinge.

The arches that have been described are all gravity arches, *i.e.* the materials of the arch are always in compression. If there were tension anywhere, the joints of the voussoirs would open or the cast-iron would crack. Both steel and reinforced concrete are strong in tension; and advantage is taken of this to build longer and lighter arches, called elastic arches.

Steel arches are sometimes curved plate girders; but the more general practice is to use curved trusses called braced arches. A noteworthy example is Sydney Harbour Bridge, (4), p. 1424, opened in 1932, which has a span of 1,650 ft. Its span is exceeded only by the 1,652 ft. Bayonne Bridge, at Kill van Kull, New York, completed in 1931. The Tyne Bridge, (2), p. 1424, is another fine structure. Reinforced concrete is specially suited to the elastic arch, as it lends itself to architectural treatment and is relatively cheap. The Plongastel Bridge in Brittany, designed by Freysinnet, has a reinforced concrete span of 613 ft.

SUSPENSION BRIDGES. These consist essentially of two cables or chains which span the river, pass over towers on each bank, and are anchored to masses of masonry behind the towers. The greater the dip in the cable, the less the stress in it. Cross-beams, suspended by hangers from the cables, support the roadway. Traffic crossing the bridge tends to set up a longitudinal ripple motion in the roadway as the load reaches successive cross-beams, while a side wind may set up a dangerous sway. The roadway is therefore built of two or four stiff trusses which transmit the reaction from the traffic load to a large number of hangers, so preventing the cables from changing shape. The trusses are braced horizontally to prevent wind-sway.

The Chinese constructed chain suspension bridges in the 14th century. The links were narrow strips of wrought iron connected by bolts passing through holes at the ends of adjacent links. The same method was adopted by Telford, *e.g.* for the 570-ft. Menai Bridge opened in 1826.

The first wire cable used was in a 408-ft. suspension bridge at Philadelphia in 1816. Wire cables have

been developed to such strength that much longer spans can be used in a suspension bridge than in any other type: the Golden Gate Bridge at San Francisco, (1), p. 1424, had a span of 4,200 ft., the longest in the world when it was opened in 1937.

FLOATING BRIDGES. Bridges with roadways supported on boats or pontoons moored a distance apart are primarily for military use and one of the earliest was that built by Xerxes to cross the Hellespont in 500 B.C. Although rarely used, pontoon bridges are occasionally built as permanent structures where there is difficulty in providing mid-river foundations. An example is the 1,530-ft. Galata Bridge carried on pontoons over the Golden Horn in Istanbul (*q.v.*). A 250-ft. section opens to allow ships to pass.

MOVABLE BRIDGES. These are used where a fixed bridge cannot be built at a high enough level to allow the passage of ships. There are four main types:

(a) The swing bridge, *e.g.* Boothferry Bridge, (1), p. 1423, in which a portion of the bridge turns on a pier to allow free way.

(b) The vertical lift bridge, such as the Tees Bridge, (2), p. 1423, in which a span is lifted up by two towers.

(c) The bascule, such as the Tower Bridge, (3), p. 1423, in which a span rolls back on a curved heel and lifts vertically.

(d) The transporter bridge, such as that at Runcorn, (4), p. 1423, where a travelling platform, hanging from rails fixed to a suspension bridge, carries traffic across the river.

Bridge. Card game for four players. The origin of bridge is uncertain and there are conflicting opinions as to when it was first introduced into the U.K.; but the first recorded game seems to have been played in Constantinople in 1874. It was started by a Rumanian as *biritch* or *britch* (card) and was at first popular chiefly in eastern Europe. Its earliest appearance in the U.K. was probably among the Greek colony in Manchester about 1880. Lord Brougham in 1894 introduced the game of straight bridge to the Portland club, the chief card-playing club in London, and a committee drafted a code of laws. These were considered by a joint committee of the Portland and Turf clubs and became the official laws of English bridge. Soon straight bridge had replaced whist as the standard game in clubs and private houses, and held undisputed sway for about

ten years, when it was superseded by auction bridge.

The invention of auction is generally attributed to John Doe, but although he wrote, in 1902, the first article on the game, he disclaimed having devised it. Auction maintained unchallenged popularity until about 1929, although attempts were made in the 1920s to introduce and popularise *plafond* which, as its name suggests, originated in France. *Plafond* introduced the idea of scoring towards game only those tricks bid and made. From auction and *plafond* Harold Vanderbilt evolved contract bridge, which introduced new scoring and the feature of vulnerability. Ely Culbertson says contract was first played in 1925 in a liner sailing between Havana and Los Angeles.

Contract quickly became widely popular in the U.S.A. The U.K. was slower to adopt it, and those who did play had to follow American laws until 1929, when the Portland club consented to legislate for the game. Thereafter contract bridge became the most respected and perhaps the most played card game throughout the world. In 1932 a joint committee of the Portland club, the Whist club of New York, and the Commission Française du Bridge issued international laws (revised in 1948).

METHOD OF PLAY. Bridge is played by four people. Partners are determined by drawing, those drawing the two highest cards playing against the others. The drawer of the highest card has first deal, giving 13 cards to each player. Straight bridge differs from the very similar game of whist in that the trump suit is chosen by the dealer or his partner, and once the first card has been played the dealer's partner (the dummy) lays his cards face up on the table and the dealer plays his own and the dummy hand. The player on the left of the dealer makes the opening lead, play then proceeding to the left. A player must follow suit if he can; otherwise he trumps or discards. The highest card of the suit led, or the highest trump played, wins the trick, and its owner leads to the next trick. In each suit the cards rank from ace, king, queen, jack, ten, down to two.

Scoring is of two kinds. Points towards a game are scored for all tricks won over six. A rubber is the best of three games. All

other points add only to the value of the rubber; they are scored for honours (the five top trumps, or aces when playing in no-trump), little slam (winning 12 tricks), and grand slam (winning 13).

Auction Bridge

Auction bridge, as its name implies, introduced competitive calling to settle the trump suit. After the deal is completed, the dealer must make a bid; each player in rotation clockwise then bids or passes. Each bid must name either a greater number of odd tricks than the preceding bid, or an equal (or higher) number in a higher ranking suit. Suits rank upwards as follows: clubs, diamonds, hearts, spades, no-trump; therefore three diamonds overcalls three clubs, but four clubs is required to overcall three diamonds. An adverse call may be doubled, and the side which has been doubled may re-double. This greatly affects the score, but not the ranking of contracts. The auction ends when three players in succession have passed. The final bid in the auction becomes the contract, and if the contract is in a suit each card of that suit is a trump. The partner in the contract who first named the trump suit (or no-trump) is the declarer and plays the hand, his partner becoming dummy. If the declarer makes his contract, *e.g.* if, at a contract of two, he takes at least 8 tricks, every trick over six counts towards game. Each club trick is worth 6, diamond 7, heart 8, spade 9, no-trump 10; game is 30. Opponents score points for defeating the contract, and there are bonus points for winning games and rubbers.

Contract Bridge

In contract bridge the unique feature of vulnerability was introduced. This means that a side which has won one game is subject to higher bonuses and penalties. Game is 100; a trick in clubs or diamonds counts 20; in hearts or spades 30; in no-trump 40 for the first and 30 for each other trick. In contract no one need call, the hand being abandoned if there is no call. Only what is bid and made is scored towards game, extra tricks counting bonus points only. Accurate bidding is therefore of greater importance in contract than in auction, and the exchange of information between partners needs to be as precise as possible.

BIDDING IN CONTRACT. Bidding calls for valuation, inference judgement, and psychology, the object of each hand being to find the best result for the 26 cards of the partnership, either at a contract of its choice or in defence against the opponents' contract. Valuation is the count of winners and losers in a hand. Positive and negative inferences can be drawn from the kind of bid, *e.g.* opening bid, partner's response, overcall, shut-out bid, forcing bid. As bidding proceeds, each player will re-value his cards to determine whether his side will score more, or lose less, if he becomes declarer or dummy, or if he and his partner are defenders.

At a suit contract tricks are made in three ways: by high cards (honour tricks); by lower cards established after several rounds of 4-card or longer suits (long card tricks); and by ruffing losing cards with trumps (ruffing tricks). At a no-trump contract, tricks are made only by high and long cards. It follows that honour cards and the distribution of the four suits are the elements to be considered in bidding.

Bidding Systems

Most systems of bidding fall into one of two classes. They count either tricks for groups of honours plus long cards, or points for individual honours and short suits. There are about 8 to 8½ honour tricks, or 40 points, distributed in each deal, and if a partnership holds 5½ honour tricks, or 26 points, there is generally a game present. An opening bid of one of a suit is made in more than 80 p.c. of all deals, and it implies at least 2½ honour tricks or 11 points with a 5-card re-biddable suit, or 3 honour tricks or 13 points with a 4-card suit. Partner can add his own count and know the combined minimum held on the first round of bidding. Long experience has shown that some conventions, by no means all artificial, are necessary, and players are expected to state what conventions they use before the game begins. Most good systems, for instance, use the method called one-over-one. This means that when partner responds to an opening bid of one of a suit with one of a higher ranking or two of a lower ranking suit, the opening bidder must speak once more. That makes it necessary for the opener to be ready with a genuine re-bid which will not deceive his partner.

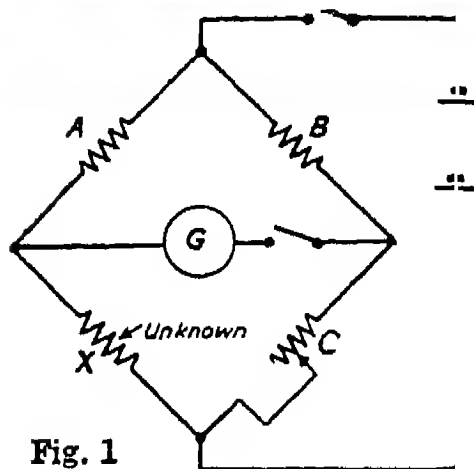


Fig. 1

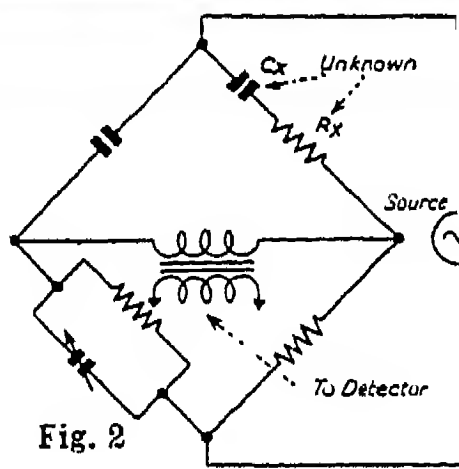


Fig. 2

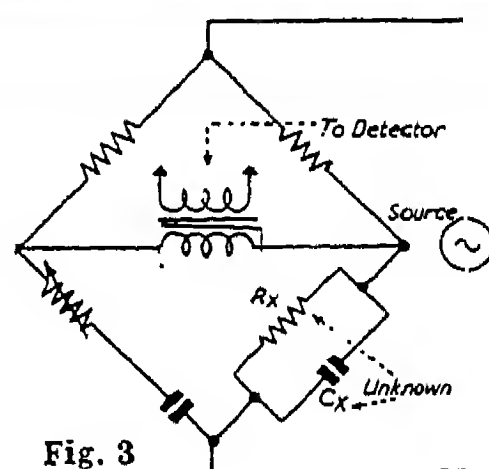


Fig. 3

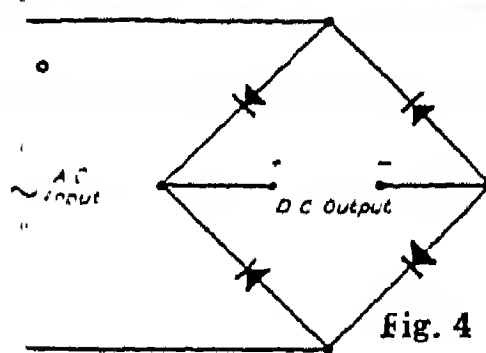


Fig. 4

resistance of components at any desired frequency. Among these

are the Maxwell, Hays, Mutual-inductance, Schering, and Wien bridges. The Schering bridge (fig. 2) is one of the few bridge circuits which operate satisfactorily at frequencies up to 60 Mc/s. The Wien bridge (fig. 3) can be used for measuring frequency as well as reactance, and is suitable for forming the tuning network in oscillators. Quite low powers are generally adequate for the bridge energising-source—usually a valve oscillator. Care is needed in the design of the output transformer feeding the bridge, to ensure reasonable impedance matching and to prevent indefinite stray capacitances from being thrown across the network. Freedom from harmonics is desirable if earphones are used to detect balance; sometimes a valve voltmeter or a cathode ray oscilloscope is used for this purpose, but with radio-frequency bridges a radio receiver is needed. A double-screened transformer often provides the coupling between bridge and detector input.

Bridge circuits also have extensive application in general electrical work. Fig. 4 shows a bridge rectifier used for converting alternating current to direct current, fig. 5 illustrates a ring bridge used for modulating. A favoured circuit in radio-frequency transmitter output stages is a push-pull circuit with neutralising feedback. Bridges

are used in automatic-control devices because it is often convenient to include the sensing

element in one arm of the bridge and adjust for balance under normal conditions. There is then no output from the bridge but, under abnormal conditions, the bridge becomes unbalanced and the resulting output signal from it can be used to set the control mechanism into operation.

Bidding S. J. Simon 1949; Bridge is an Easy Game, I. N. Macleod, 1952; Money Bridge, E. Mayer, 1954.

Bridge, ELECTRICAL. Electrical circuit incorporating resistance, capacitance, and impedance, used for a number of electrical and electronic purposes, chiefly the measuring of electrical properties. The many types of electrical bridge derive from the bridge designed by Charles Wheatstone in 1847. The Wheatstone bridge takes current from a small battery and embodies non-inductive resistances as circuit elements.

Fig. 1 shows the circuit of a typical Wheatstone bridge. If the resistances of A and B are known and C is a calibrated variable resistance, then the value of the unknown resistance can be determined by varying C until there is no deflection of the galvanometer needle G, since under these conditions $X = AC/B$. In practice, A and B are fixed resistors of some round value

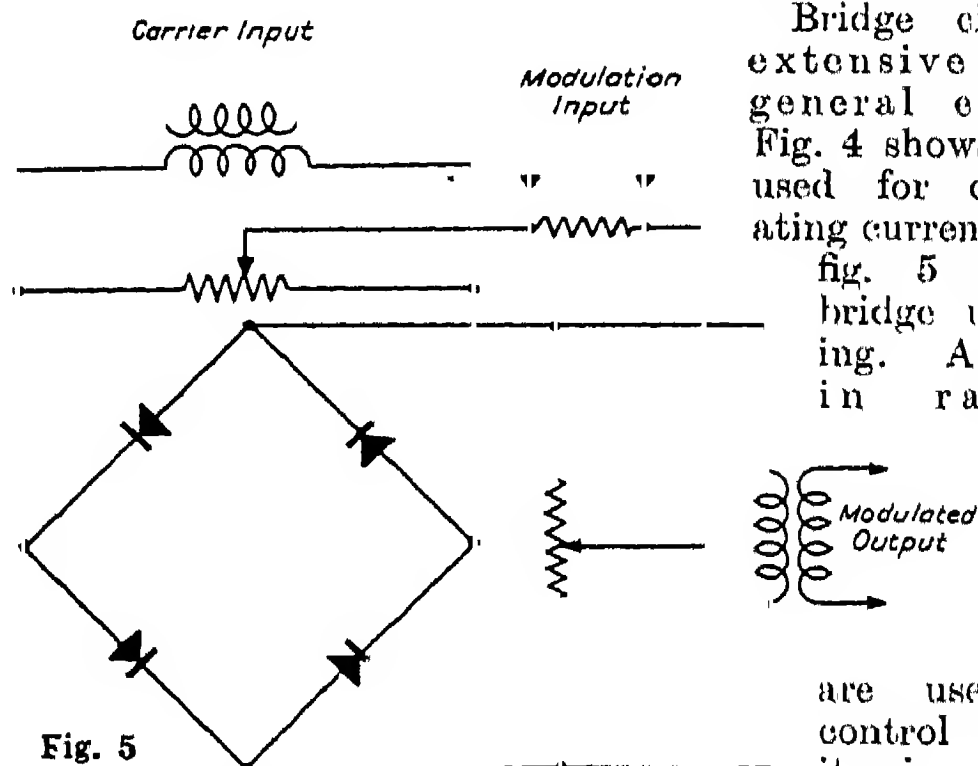


Fig. 5

such as 1,000 ohms provided with tappings at 100, 10, and 1 ohms so that a very wide range of unknown resistance values can be handled by one instrument.

A number of alternating current bridges have been developed from the Wheatstone bridge for determining the reactance and

Conventional meanings have attached themselves to an opening of one no-trump, which shows a given number of honour tricks or points and an evenly distributed hand; two of a suit on enormously powerful cards, after which both partners are "forced" to go on bidding up to game (or double the enemy for a penalty of equal value); three or more of a suit, which shows that his strength is concentrated in that suit and aims, by pre-emption, at keeping the opponents from bidding possibly from greater strength, or at driving them into the wrong contract.

The opener's partner is expected to respond on very little. He may raise a suit bid if he has good trumps; bid one no-trump with some scattered values; call his own suit; jump one round (e.g., two spades or three clubs over one heart) to force his partner if he can tell that a game ought to be present. But on the most interesting hands the bidding will not be simple and one-sided, for opponents will be competing.

Play of the cards must be learnt. Probably no one can handle them in expert fashion without books or tuition. Perhaps 80 p.c. of the hands are easy; the remainder call not only for faultless technique but for inference and analysis of a high order. The declarer has to establish long suits or ruff short ones, preserve entries to both hands, throw the lead to either opponent, always counting how many tricks he can afford to lose. Defenders must know conventional leads, how to signal to their partners with high or low cards when following suit, how to interrupt communications between declarer and dummy, when to take risks and when to play safe.

Bibliography. The Stern Austrian System, P. Stern, 1938; Official Book of Contract Bridge, E. Culbertson, 1942; Better Bridge for Better Players, C. H. Goren, 1943; Why You Lose at Bridge, S. J. Simon, 1945; Reese on Play, J. T. Reese, 1948; Design for

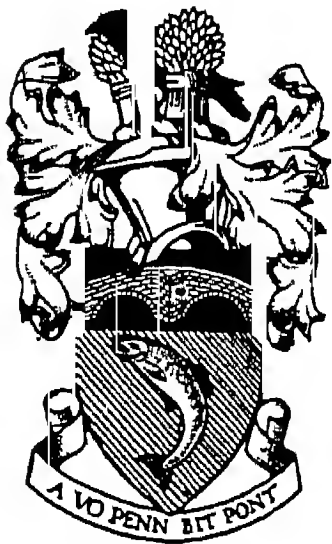
Bridge, FRANK (1879-1941). British composer, conductor, and viola-player. Born at Brighton, Feb. 26, 1879, he studied at the R.C.M., and won a composition scholarship in 1899 which enabled him to study with Stanford. On leaving the R.C.M., he joined the English String Quartet as a viola-player and also conducted opera at Covent Garden and orchestral concerts. In 1923 he toured America, conducting his own compositions. He made his reputation as a composer with chamber music, his Fantasy-Trio winning the Cobbett prize in 1908. Two fine orchestral pieces were his Sea Suite, and Lament. He died at Eastbourne, Jan. 10, 1941.



Frank Bridge,
British musician

Bridgehead. Defensive work commanding the end of a bridge nearest the enemy, or covering the passage of a river or canal. In an offensive sense, a bridgehead is the area on the far side of a river which assault troops hold under the protection of their artillery and air cover.

Bridgend. Urban district and market town of Glamorganshire, Wales. It stands in the beautiful Vale of Glamorgan, on both banks of the river Ogmore, 20 m. W. of Cardiff. It is a rly. junction, and has an iron foundry and numerous light industries. A large



Bridgend arms

trading estate stands immediately on the S. boundary. Market days, Tues. and Sat. Pop. (1951) 13,643.

There are vestiges of a 12th-century castle, and in the vicinity are Eweny priory and the villages of Coychurch and Coity, both with ancient churches. Coity also has a castle, and there are remains of Ogmore castle near the small resort of Ogmore-by-sea at the river mouth.

Bridge of Allan. Police burgh of Stirlingshire, Scotland. On Allan Water, 3 m. N. of Stirling, it is a residential town and holiday resort, in a sheltered and beautiful situation and with a mild climate.

It developed as a small spa in the mid-19th century, but the demand for the waters waned. The annual Strathallan Gathering is held near by. Pop. (1951) 3,173.

Bridgeport. City and seaport of Connecticut, U.S.A., co. seat of Fairfield co. On an arm of Long Island Sound, 58 m. N.E. of New York, it is served by the New York, New Haven, and Hartford rly. With a small but good harbour, it is the chief manufacturing city of Conn., its products including electrical equipment, firearms and ammunition, sewing machines, typewriters, tools, machinery, clothing and textiles. It is the site of a university and an engineering institute. P. T. Barnum, who lived here, is commemorated by a statue and the Barnum Institute of Science and History. His most famous exhibit, "General Tom Thumb" (Charles Stratton), was born here. Settled in 1639, Bridgeport was incorporated in 1836. Pop. (1950) 158,709.

Bridges, SIR EDWARD ETINGDENE BRIDGES, BARON (b. 1892). Son of Robert Bridges, he was born Aug. 4, 1892, and was educated at Eton and Magdalen College, Oxford. He entered the Treasury, 1919, and was principal assistant secretary 1937-38. He was permanent secretary of the cabinet (including the war cabinet) 1938-46. Knighted 1939, he was permanent secretary of the Treasury (at that time, head of the civil service) 1945-1956. He was made P.C. in 1953, and created a baron in 1957.

Bridges, SIR (GEORGE) TOM (MOLESWORTH) (1871-1939). British soldier and administrator who commanded the first unit of the British Expeditionary Force to encounter the Germans in the First Great War (Aug. 22, 1914, near Soignies), and five days later, at St. Quentin, rallied with a toy drum and tin whistle two British battalions at the point of surrender, leading them back into contact with the main force. This incident was celebrated in verse by Sir Henry Newbolt. Tom Bridges was born at Eltham, Kent, Aug. 20, 1871, son of an elder brother of the poet Robert Bridges, and was educated at Newton Abbot College and the Royal Military Academy. He entered the army 1892, and served with distinction in the South African War. In spite of severe wounds he continued in active service until 1922, was in charge of a number of military missions to the U.S.A. and elsewhere, arranged the evacuation of Denikin's army

from Novorossiisk, 1920, and was with the Greeks at Smyrna (Izmir) when the Turks drove them from Asia Minor. He retired with the rank of lieutenant-general, and during 1922-27 was governor of South Australia. He died Nov. 26, 1939. He published his reminiscences, *Alarms and Excursions*, in 1938, and compiled an anthology, *Word from England*, published posthumously in 1940.

Bridges, ROBERT SEYMOUR (1844-1930). British poet, the perfection of many of whose short lyrics (e.g. I love all beautiful things; Spring goeth all in white) has scarcely been equalled by any of his contemporaries. Born Oct. 23, 1844, he went to Eton and



Robert Bridges,
British poet

Corpus Christi, Oxford, where he formed a friendship that was to be lifelong with Gerard Manley Hopkins (*q.v.*), later priest and poet. After Hopkins joined the Jesuits he used to send poems from time to time to Bridges, who gave them to the public in a volume in 1918.

Bridges studied medicine at St. Bartholomew's, London, and afterwards held posts at the Children's Hospital in Great Ormond Street and the Great Northern Hospital. An intended early retirement was hastened by a serious illness in 1881. He received the O.M. 1929. He lived, in Berkshire, at Boar's Hill and Yattendon, where he is buried. He died April 21, 1930.

A few volumes of his poetry were privately printed by C. H. O. Daniel, of Worcester College, Oxford, and in 1890 two small books, *Shorter Poems* and the verse play *Achilles in Scyros*, were published through ordinary channels. In 1913 he was made poet laureate. Though his serenity in expression and lofty standard of workmanship could never secure him any general popularity, he was accepted as the most scholarly, most classical, and most artistic of modern poets.

His *Milton's Prosody*, 1893, contains a detailed study of English metre, and he experimented in the use of new metres. He was an advocate of phonetic spelling, and took a deep interest in music. He was a co-founder of the Society for Pure English, 1913. In 1916 he compiled an anthology, *The Spirit of Man*. In the last year of his life he produced *The Testament of*

Beauty, a sustained achievement in loose hexameters, regarded by many as his masterpiece. *Consult* Life, Edward Thompson, 1945.

Bridget OR BIRGITTA (1302-73). Swedish saint. A daughter of the governor of Uppland, Sweden, and of royal descent, she was born near Uppsala and married at the age of 13. Of her eight children, one became S. Catherine of Sweden. In 1341 she made with her husband the great pilgrimage to the shrine of S. James of Compostella in Spain. Three years later, after the death of her husband, she founded a convent at Vadstena, in E. Gothland, and established a new religious order, the Brigittines or order of S. Saviour. This order spread over Europe, and in England in 1415 Syon House, Isleworth, was the chief convent. This house, removed to Chudleigh, Devon, in 1887, is one of the nine existing Brigittine nunneries. S. Bridget journeyed to Rome in 1350, where she died July 23, 1373. She was canonised in 1391; her festival is Oct. 8.

This Swedish saint should not be confused with the Irish saint Brigid.

Bridgeton. City and port of entry of New Jersey, U.S.A., the co. seat of Cumberland co. On Cohansey Creek, 38 m. S. of Philadelphia, it is served by the New Jersey Central and the West Jersey and Seashore rlys. It has a public library, hospitals, an academy, a seminary, and a state institute, and iron foundries, glass works, and fruit canneries. Settled in 1688, the town was incorporated 1865. Pop. (1950) 18,378.

Bridgetown. Capital and chief port of Barbados, B.W.I. It is the seat of a bishop, contains Codrington Theological College, the governor's residence, House of Assembly, barracks, and arsenal, and is the headquarters of the British West Indian troops. The harbour is a fine, open roadstead. Bridgetown has an export trade in sugar, alocs, molasses, and mineral oil, and is connected by rly. with the interior. Pop. 13,000.

Bridgewater, DUKE OF. English title borne by the family of Egerton from 1720 to 1803. In 1617 John Egerton was made earl of Bridgewater; he was a younger son of Sir Thomas Egerton, the lord chancellor who was made Viscount Brackley. Scroop, the 4th earl, was created duke in 1720, and the title passed to his two sons. It became extinct when the 3rd duke died in 1803. The earldom continued in the family until 1829.

**Bridgewater, FRANCIS EGER-
TON, 3RD DUKE OF (1736-1803).** British nobleman, known for his interest in canals. Born May 21, 1736, he was a younger son of the 1st duke, and was only twelve when he succeeded his brother in the title. His chief property was in and around Worsley, near Manchester. There coal was beginning to be mined, and when quite a young man the duke conceived the idea of making a canal to carry the coal. James Brindley was employed by him, and in a few years a canal from Worsley to Manchester had been successfully cut. The duke then undertook the construction of a canal between Manchester and Liverpool. (See Bridgewater Canal.) The duke, who was unmarried, died March 8, 1803. See Canal; Ellesmere, Earl of.

**Bridgewater, FRANCIS HENRY
EGERTON, 8TH EARL OF (1756-
1829).** Founder of the Bridgewater Treatises. Son of John Egerton, bishop of Durham, and born Nov. 11, 1756, he was educated at Eton and Christ Church, Oxford, and became a fellow of All Souls in 1780.



Francis Henry
Egerton,
8th earl of Bridgewater
Giraud

In 1781 he was made F.R.S. He succeeded his brother as earl in 1823 and died unmarried Feb. 25, 1829, the earldom becoming extinct. He bequeathed to the British Museum £12,000 and the so-called Egerton MSS., chiefly on French and Italian history and literature. To the Royal Society he left £8,000 to be paid to the author of the best treatise on "The Power, Wisdom and Goodness of God as manifested in the Creation." This sum was divided equally between eight persons, the treatises being: The Adaptation of External Nature to the Moral and Intellectual Constitution of Man, by Thomas Chalmers, 1833; Chemistry, Meteorology and the Function of Digestion Considered with Reference to Natural Theology, by William Prout, 1834; The History, Habits and Instincts of Animals, by William Kirby, 1835;

Geology and Mineralogy considered with Reference to Natural Theology, by William Buckland, 1837; The Adaptation of External Nature to the Physical Condition of Man, by John Kidd, 1837; The Hand, its Mechanism and Vital Endowments as Evincing Design, by Sir Charles Bell, 1837; Astronomy and General Physics compared with Reference to Natural Theology, by William Whewell, 1839; and Animal and Vegetable Physiology considered with Reference to Natural Theology, by Peter Mark Roget, 1840.

Bridgewater Canal. Artificial waterway, 42 m. long, of Lancashire and Cheshire, England. Francis Egerton, 3rd duke of Bridgewater (1736-1803), had it constructed by James Brindley to provide cheap transport to Manchester from his collieries at Worsley; it was filled on July 17, 1761; an extension from Worsley to the Mersey, providing a link with Liverpool, was completed 1776. The building of the Bridgewater canal marked the inauguration of the canal era that preceded the railways, and the duke is regarded as the "father" of inland navigation in Great Britain. The canal was transferred in 1872 to the Bridgewater navigation co., and was purchased in 1887 by the Manchester ship canal co. for £1,710,000.

Bridgewater House. London mansion, until 1947 residence of the earls of Ellesmere, lying to the E. of Green Park. The site was once occupied by the town house of the Howards, earls of Berkshire, which was bought and presented by Charles II to Barbara, duchess of Cleveland, who named it Cleveland House. The duke of Bridgewater purchased Cleveland House in the early 18th century, had it altered and re-faced, and renamed it. A new Italianate house built on the site by Barry, 1847-50,



Bridgewater House, St. James's, London

retained the name Bridgewater House; it was badly damaged in the Second Great War.

Bridgman, LAURA DEWEY (1829-89). American blind, deaf mute who was the first person so



Laura Bridgman,
American blind
deaf mute

handicapped to be systematically educated. Born at Hanover, N.H., Dec. 21, 1829, when she was two she lost her sight, speech, and hearing through an illness, and in 1837 she was placed under the care of Dr. Samuel Gridley Howe at the Perkins institution for the blind at Boston, where she remained for the rest of her life. She learned to read embossed letters and words by touch. Then it was discovered that she could communicate her thoughts by touching a board containing metal types of the letters of the alphabet. She was taught geography, arithmetic, and history, became expert at needlework, and also wrote a legible hand. She undertook light household duties and taught sewing, and for a time taught arithmetic to a deaf and near-blind child. The discoveries made in teaching her were of assistance in the early education of Helen Keller (*q.v.*). She died May 24, 1889.

Bridgman, PERCY WILLIAMS (b. 1882). An American physicist. A graduate of Harvard, he was professor of physics there, 1919-1926, then becoming Hollis professor of mathematics and natural philosophy. In 1928 he received the medal of the royal academy of the Netherlands and in 1929 the Comstock prize of the American natural academy of sciences. In 1946 he was awarded the Nobel prize in physics for his design for an apparatus to create extremely high nuclear pressure. He wrote many scientific books, also *The Intelligent Individual and Society*, 1938.

Bridgnorth. Mun. bor. and market town of Shropshire, England. Divided by the river Severn into an upper and a lower town, it is 22 m. S.E. of Shrewsbury by railway. It has a grammar school founded at the beginning of the 16th century, an old town hall, and a tower of the old castle. Bridgnorth is thought to be of Saxon origin. Its castle, built by Robert de Belesme, was successfully held against Henry I, but in 1646 was demolished by the Parliamentarians. Two members

were returned to parliament from 1295 to 1867, and one until 1885. Bridgnorth was the birthplace of Bishop Percy, whose house still stands. A trade in agricultural produce is carried on, and carpets, electronic instruments, and aluminium foil are made. Market day, Sat. Pop. (1951) 6,250.

Bridgwater. Mun. bor., seaport, and market town of Somerset, England. On both banks of the Parret, it is 12 m. by river from Bristol Channel and 33 m. S.W. of Bristol. The town is served by three railway lines, and is connected by canal with Taunton. Ships of 700 tons can reach the town. It is the only place in the U.K. engaged in making bathbricks. Called Burgh-



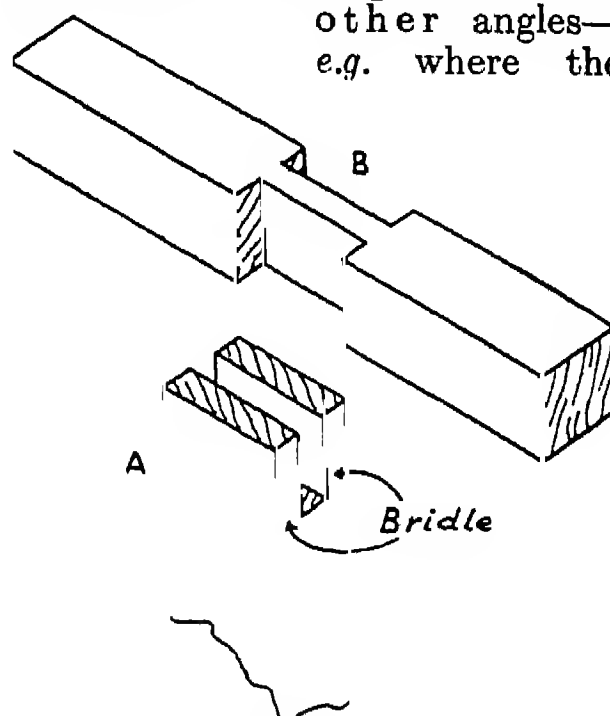
Bridgwater seal

Walter, Bridgwater secured its first charter in 1200. It played a conspicuous part in the Civil War, during which it twice changed hands, and in its castle Monmouth was proclaimed king. The battle of Sedgemoor, 1685, was fought near by. Admiral Blake was a native. Bridgwater gives its name to a co. constituency. Market day, Wed. Pop. (1951) 22,221.

Bridie, JAMES. Name under which the Scottish doctor Osborne Henry Mavor (1888-1951) became a successful playwright. He was born at Glasgow, Jan. 2, 1888, and was educated at the academy and university. After the First Great War he returned to his native city and practised as a consulting physician at the Victoria infirmary. He scored his first outstanding success as a dramatist with *The Anatomist* (*q.v.*) in 1931. Other comedies included *Tobias and the Angel*, 1930; *Jonah and the Whale*, 1932; *A Sleeping Clergyman*, 1933; *Mary Read* (with Claud Gurney), 1934; *Storm in a Teacup* (adaptation), 1936; *The King of Nowhere*, 1938; *Mr. Bolfray*, 1943; *It Depends What You Mean*, 1944; *Dr. Angelus*, 1947; *Daphne Laureola*, 1949. He was made C.B.E. 1946, and died Jan. 29, 1951. Bridie's comedies were witty and full of intellectual interest, sometimes enhanced and sometimes impeded by twists of fantasy.

Bridle Joint. Woodwork joint (see diagram). The bridle prevents any lateral movement of the member A. This example shows the two members meeting at right

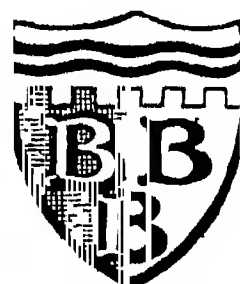
angles, but bridle joints are much used where the two parts meet at other angles—e.g. where the



Bridle Joint. Woodwork joint which prevents lateral movement of parts

sloping strut of a roof truss meets the horizontal member, or tie. In such a position the tie is notched out to receive the ends of the bridle.

Bridlington. Mun. bor., market town, and watering place in the E. Riding of Yorkshire, England. It is 33 m. N. of Hull on the railway. The old town lies 1 m. inland, and has an imposing 13th-15th cent. Priory church and an interesting 14th cent. gatehouse. The modern town has grown up to the N. and S. of Bridlington Quay, with its small secure harbour on Bridlington Bay. There are fine sands, two stone piers, promenades, up-to-date entertainment halls, and a spa. This is an especially popular holiday resort for families from the W. Riding. It gives its name to a county constituency. Pop. (1951) 24,661.



Bridlington
arms

Bridport. Mun. borough and market town of Dorset, England. On the river Brit, it is 18 m. W. of Dorchester by the railway. The main street and rly. extend to the sea at West Bay, which has a small harbour. Bridport manufactures ropes—a "Bridport dagger" was the hangman's rope—cordage, sailcloth, and fishing-nets, imports flax, and exports sand and grit. An ancient town, it had a mint for silver coins. From 1295 to 1867 two members were returned to parliament, then one until 1885. Market day, Wed. Pop. (1951) 6,273.

Bridport, ALEXANDER HOOD, VISCOUNT (1727-1814). British admiral. Son of a West of England clergyman, and younger brother of Samuel, Lord Hood, he entered the navy 1741. He commanded the

Minerva frigate in the battle of Quiberon Bay, 1759, and the Robust in Keppel's indecisive action with D'Orvilliers off Ushant in 1778. As a rear-admiral he was present under Howe at the relief of Gibraltar in 1782, and in 1794 was second in command on the glorious First of June, receiving an Irish peerage as a reward for his services. In 1795 his action with Villaret-Joyeuse off Brest gained for him a British peerage. He died May 2, 1814.



Lord Nelson
After L. F. Abbott

Brie. Small district and town N.E. of Paris, celebrated for its manufacture of a soft, whole-milk cheese, which ranks next to Camembert with most gourmets, and above it with some. It is seasonal, being at its best in the months when milk is richest. It is made in rounds more than a foot in diameter, and about 1 in. thick. The real Brie is in great demand, but its reputation has suffered by many inferior imitations.

Brief (Lat. *brevis*, short). In English law, a statement in writing furnished by a solicitor to counsel, to instruct him as to the facts of a case. Hence counsel is said to be "briefed" in a case. The name indicates that in theory such a document ought to be as concise as possible. See Barrister.

Brief, PAPAL. Name applied to an official letter from the pope. It is always written in Latin, is sealed with the fisherman's ring on wax, and has the authority of a bull. See Bull.

Brieg (Pol. Brzeg). Town of Silesia, under Polish administration from 1945. On the Oder, 28 m. S.E. of Breslau (Wrocław), it is a port and rly. junction, a centre of the cattle trade, and has food processing, tanning, sugar refining, and chemical industries. Its historic buildings, including the ducal palace, 16th-century town hall, and old churches, suffered heavy damage in the Second Great War. The population, 31,419 in 1939, was only 7,744 in 1946.

Founded in the 13th century by Poles, Brieg was for 300 years the capital of a small duchy. Over this and other Silesian duchies Prussia, by a treaty, secured rights of inheritance, but Austria, which had a counter-claim, seized it in 1675, when the last duke died, and the

decision of Frederick the Great to dispute this was one cause of the War of the Austrian Succession, 1740-48.

Brieg, BRIG, OR BRIGUE. Town of Switzerland, in the canton of Valais. It stands on the Rhône, 90 m. by rly. E. of Lausanne, at the N. end of the Simplon Pass. It is a rly. junction, and has flour and printing industries; there are hydro-electric plants near by. The Stockalper palace dates from the 17th century. Pop. (est.) 3,500.

Briel OR BRIELLE. Seaport and town of the Netherlands, on Voorne Island in the province of South Holland, at the mouth of the Maas, 14 m. W. of Rotterdam. It has an arsenal, barracks, an old orphanage, a town hall, and a 15th century Gothic church with a fine tower. Its capture by the "water-beggars" (Gueux), 1572, was the first open act in the Dutch War of Independence. Admiral Martin Tromp was born here.

Brienne-le-Château. A town of France, in the dept. of Aube. On the river Aube, 26 m. by rly. N.E. of Troyes, it grew up around the château built in the 18th century by a member of the family that took its name from this place. The château is open to the public, and has some fine pictures. The church is 16th century. There was once a military school here, attended by Napoleon. The counts of Brienne included several famous personages, among them John, king of Jerusalem. An indecisive battle was fought here, Jan. 29, 1814, between Napoleon's armies and the Allies.

Brienzi. Lake of Switzerland, in the canton of Berne. Lying in a valley N. of Interlaken, 1,857 ft. above sea level, it is 9 m. long, 1½ m. across, and 11½ sq. m. in area, and has a greatest depth of 860 ft. On the S. shore is the Giessbach waterfall, and to the N.E. lies the Rothhorn, commanding a view of the Bernese Alps. The lake is memorably described in Belloc's *The Path to Rome*.

Brienzi. Village of Switzerland, in the canton of Berne. On Lake Brienzi, 8 m. W. of Meiringen, it is the centre of the Swiss wood-carving industry, and has a rly. up the Rothhorn.

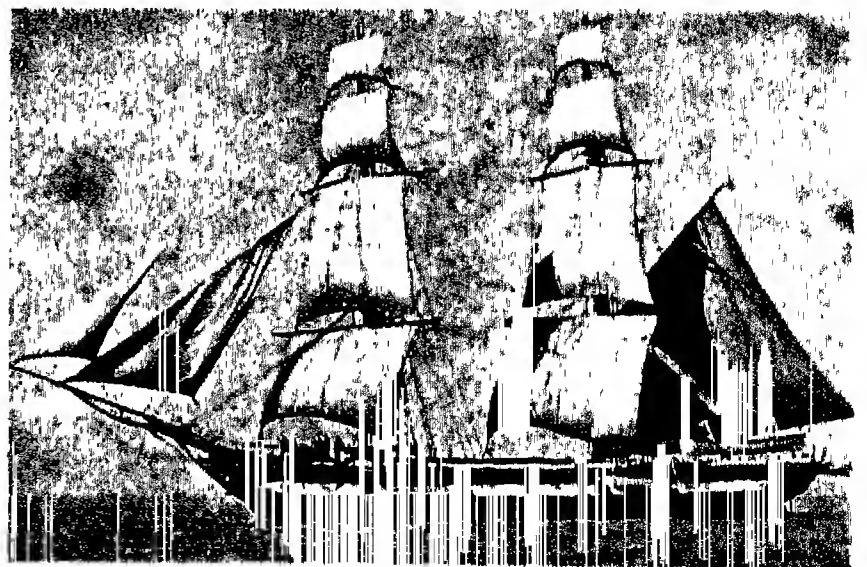
Brierley, BENJAMIN (1825-96). British writer of stories in the Lancashire dialect. Born at Fails-

worth, near Manchester, June 26, 1825, the son of a weaver, he was himself a weaver from his 6th to his 38th year. In 1856 he began to write tales and articles in the dialect of the working people of S. Lancashire. In 1863 he became sub-editor of *The Oldham Times*, and during 1869-91 edited *Ben Brierley's Journal*. His chief works are *A Day's Out*, 1856; *The Layrock of Langley Side*, 1864; *Marlocks of Merriton*, 1867; and *Cotters of Mossburn*, 1871. He died at Manchester, Jan. 18, 1896.

Brierley Hill. Urban dist. and market town of Staffordshire, England. It now takes in the former districts of Kingswinford and Quarry Bank. On the river Stour, it is 2½ m. N.E. of Stourbridge, on the rly., and is also served by canals. Its glassware is world-famous, and in addition firebricks, anchors, chains, foundry products, tinsplate, steel, enamelware, and tiles are made. Here is one of the biggest meat and bacon factories in the country. There is a central library in the technical institute. Market days, Tues. and Sat. Pop. (1951) 48,943. Brierley Hill gives its name to a co. constituency.

Brieux, EUGÈNE (1858-1932). French dramatist. Born in Paris, Jan. 19, 1858, he first made his mark with *Ménages d'Artistes* at the Théâtre Libre in 1890. Afterwards he wrote a series of plays dealing with social questions: *Les Trois Filles de M. Dupont*, 1897; *La Robe Rouge*, 1900 (Eng., *The Arm of the Law*); *Les Avariés*, 1901 (Eng., *Damaged Goods*). The subject of the last, being the danger of syphilitic infection, provoked a storm of controversy. The *Three Daughters of M. Dupont* and *Damaged Goods* have been performed in London. Elected to the French Academy, 1909, Brieux died Dec. 6, 1932.

Brig. Two-masted sailing vessel carrying square sails on both masts. A brig's mainsail is the



Brig. One of the old training brigs (Martin) making full sail down the Channel
Cribb, Southsea

lowest square sail on the main-mast. A hermaphrodite brig is square-rigged forward and with fore and aft sails on the mainmast. Before the advent of steam-driven warships, naval brigs mounted 12 guns on a single deck and were used as dispatch boats and for cutting-out expeditions. Until 1904, when training in sail was abolished in the Royal Navy, brigs were attached to all naval depots for the instruction of boys before they were drafted to sea-going ships.

Brigade (Ital. *brigata*, from *brigare*, to fight). Military term for the largest unit of a division (*q.v.*). In the British army an infantry brigade normally consists of three battalions of infantry, an armoured brigade has three battalions of tanks, and an artillery brigade three R.A. regiments. On active service, however, the strength and composition of a brigade depend upon the type of operation and the character of the ground. For active service operations composite brigade groups are formed.

These generally consist of three or more battalions of infantry, a regiment of artillery, a Royal Army Service Corps company, a field ambulance company, a section of the Royal Corps of Signals, and ancillary units. A brigade group may have attached to it an armoured car squadron and a battalion of tanks. An armoured brigade includes a transport company and generally one or more troops of anti-tank guns. A brigade is commanded by a brigadier and the brigade major is senior staff officer of a brigade.

Brigades in foreign armies are much larger than the normal British brigade, consisting of about 6,500 men—nearly the equivalent of a British infantry div. In the British Indian army a brigade usually included at least one British battalion. A naval brigade consists of a force of sailors drawn from two or more warships and landed for operations ashore; it usually has a section of three-pounder field guns manned by seamen. The Royal Flying Corps had a brigade formation in 1916, its strength being equivalent to the present-day wing of an R.A.F. group. *See Army.*

Brigadier. Commander of an infantry, armoured, or artillery brigade. A brigadier ranks immediately above a colonel and below a major-general. The rank is denoted by three stars in the form of a triangle surmounted by a crown on the epaulette.



Brigadier :
shoulder
badge

Brigadier is one of the oldest military ranks and was used on the Continent in the 16th century. The first British brigadier was appointed in 1699, but the title lapsed in the British army until it was revived as a temporary rank in 1928, made substantive in 1947. A Fr. brigadier is a *n.c.o.*

Brigadier-General. A British military rank held until 1928 by an officer commanding a brigade. It was the lowest rank of general officer and was held as a temporary appointment, there being no brigadiers-general as such on the army establishment.

Brigand (Ital. *brigante*, irregular foot-soldier). Term originally applied to irregular soldiers and so to armed robbers generally, especially those who live in bands levying blackmail and extorting ransoms from their prisoners under pain of death. Brigands are found chiefly in mountainous, wooded, unsettled, and desert places, near frontiers, and in countries divided into several small states, where taxes and land tenures are oppressive, and police and officials are weak and corrupt.

Italy, Sicily, and Spain are famous in the annals of brigandage. The Italian monk, Fra Diavolo (Michele Pezza), is well known as the hero of Auber's opera; the memory of the Spanish brigand, Don José Maria, lives by Prosper Mérimée's story and Bizet's opera *Carmen*; and Pedro Rocha Guinarda appears in *Don Quixote* as the courtly Roque Guinart. Other noted brigands are the detestable Italian priest, Don Ciro Anicchiarico, whose apparently charmed life was ended by a silver bullet in 1818; Marco Sciarra of the Abruzzi, who called himself "king of the Campagna"; and the three brothers Vardarelli, who operated chiefly in Apulia. A Sicilian brigand is said to have worked very successfully with a band of straw-stuffed puppets placed in warlike attitudes. Louis Car touche (d. 1721) and Louis Mandrin (d. 1755), both broken on the wheel, were famous French brigands, and Johann Buckler, known as Schinder-Hannes (Jack the Flayer), beheaded 1803, was a celebrated robber of the Rhine.

In medieval England brigands flourished, especially at the fairs down to the reign of Henry VIII. when, with the inauguration of a

regular horse-mail between England and Scotland, they were superseded by highwaymen (*q.v.*). At fair-time in 1348 Bristol fell into the hands of brigands. English brigandage is represented by such shadowy figures as Robin Hood and the Doones of Exmoor.

In Morocco in 1903 the brigand Raisuli captured the Tangier correspondent of *The Times*, and exchanged him for some captured tribesmen.

Brigandine. Name given to a variety of body armour. It consists of small metal scales or rings stitched close together upon linen, canvas, or leather, and sometimes covered with similar material, forming a kind of tunic. It was so called from being originally worn by the *brigante*, or irregular foot soldiers of the Middle Ages.

Brigantes. Celtic people who inhabited the district between the Humber and the Forth at the time of the Roman invasion of Britain. Their capital was Eboracum (York) and they were finally subdued by the Romans before A.D. 100. They had settlements in Ireland, at Waterford and Wexford.

Brigantine. Three-masted sailing ship, square-rigged on the foremast, fore-and-aft-rigged on the main- and mizzen-masts.

Briggs, HENRY (1561–1631). English mathematician who recognized the significance of Napier's invention of the logarithm, and developed it for practical use in calculation. He was born at Warley Wood, near Halifax, Yorkshire, in Feb., 1561 (N.S.), and was appointed first lecturer on geometry at Gresham College (*q.v.*), London, in 1596, and Savilian professor of astronomy at Oxford in 1619. Soon after the publication in 1614 of Napier's *Mirifici Logarithmorum Canonis Descriptio* Briggs visited Napier in Scotland and proposed the transformation of Napier's original "logarithms" into modern logarithms to the base 10; and in 1624 published *Arithmetica Logarithmica* containing the logarithms of 30,000 natural numbers to 14 significant figures. He died at Merton College, Oxford, Jan. 26, 1631 (N.S.). His *Trigonometria Britannica* was published posthumously in 1633.

Brighouse. Bor. and market town of the West Riding of Yorkshire, England. On the Calder, 4 m. N. of Huddersfield, it has woollen, worsted, cotton, and silk factories, wiremills, dyeing and chemical industries, engineering works, flourmills, and flag-stone quarries, and makes carpets.

soap, and machinery. Brighthouse and Spenborough is the name of a co. constituency. Market day Sat. Pop. (1951) 30,587.

Bright, SIR CHARLES TILSTON (1832-1888). British electrical engineer. Born at Wanstead, Essex, June 8, 1832, he was educated at the Merchant Taylors' School, and after five years in the service of the Electric Telegraph Co. entered that of the Magnetic Telegraph Co. Of this he became chief engineer at the age of 19, laying the first successful cable to Ireland in 1853. He superintended the construction of many miles of underground telegraph wire, besides producing a number of widely adopted inventions. After experiments in sending messages over long distances, he became one of the founders of the Atlantic Telegraph Co. in 1856, acting as chief engineer, and in 1858 successfully laid the first cable between Ireland and Newfoundland, and received a knighthood when but 26 years old. He then laid the first cable to India, *via* the Mediterranean, and a little later connected up the West Indian Islands. From 1865-68 he was Liberal M.P. for Greenwich. He died May 3, 1888. His son, Sir Charles Bright (1863-1937), was also an engineer of wide experience and reputation.

Bright, JOHN (1811-89). British politician. He was born at Rochdale, Nov. 16, 1811. His father Jacob, cotton spinner, belonged to the Society of Friends. John became prominent in Rochdale in 1834 by his vigorous opposition to the collection of church rates, and in 1839 associated himself with Richard Cobden and Charles Villiers in agitating for the repeal of the corn laws, to which cause his time, until 1846, was largely devoted.

In 1843 Bright entered the House of Commons as an independent free trade M.P. for Durham, and in 1847 was elected for Manchester. That city rejected him in 1857, but in the same year he was elected for Birmingham, which he represented until his death. In 1868 he declined Gladstone's offer of the India Office, but agreed to become president of the Board of Trade. He had, however, no talent for the details of administration, and in 1870 ill-health brought about his retirement. In 1873-4 he was chancellor of the duchy of Lancaster, and he filled the same office in 1880-2, until he withdrew from the Gladstone ministry as a protest against the policy of intervention in Egypt. In 1885 he left the Liberal party on the question of Home Rule for Ireland, an action which had its

share in bringing about the fall of the ministry. He died at One Ash, Rochdale, March 27, 1889.

Bright was always a sincere advocate of international peace and of non-intervention in European affairs, and these views made him very unpopular during the Crimean War. Economically he was a leading representative of the Manchester School, believing in freedom of competition and in individualism, and opposing factory legislation. He was associated with Cobden in the campaign in favour of national economy, and his political creed is summed up in the popular phrase, "Peace, retrenchment, and reform." As a Liberal he supported the Reform Bills of 1867 and 1884, the disestablishment of the Irish Church, and the introduction of popular education.

John Bright was one of the great orators of the 19th century. He lacked Gladstone's store of learning, but he knew his Bible and the



John Bright

Engraving by Hall, from photo by Mayal.

English poets, and in natural eloquence he was that statesman's superior. He had also a gift of sarcasm, and the faculty of coining terse and expressive phrases which caught the public fancy, as when he likened Robert Lowe and his followers to the dwellers in the cave of Adullam, or when he called Disraeli the "mystery man" of his political party.

His younger brother, Jacob (1821-99), was Liberal M.P. for Manchester, 1867-74, 1876-85, 1886-95, and strongly advocated women's municipal enfranchisement, 1869. In business Bright was the head of

the firm of John Bright and Bros., and throughout he remained a member of the Society of Friends, his life being largely ordered by its tenets. He was a keen fisherman. His eldest son, John Albert Bright (1848-1924), was Liberal Unionist M.P. for Birmingham, 1885-95, and Liberal M.P. for Oldham, 1906-10. His second son, William Leatham Bright, was Liberal M.P. for Stoke-on-Trent, 1885-90. *Consult* Life and Speeches, G. B. Smith, 1881.

A. D. Innes

Bright, RICHARD (1789-1858). British physician. Born at Bristol, Sept. 28, 1789, he studied at Edinburgh, at Guy's Hospital, London, and at Berlin and Vienna, and was a physician at Guy's Hospital. He is best remembered for his investigations into cirrhotic disease and its connexion with dropsy, and his name is attached to certain affections of the kidney. (*See* Bright's Disease.) He died in London, Dec. 16, 1858. His eldest son, James Frank Bright (1832-1920), was master of University College, Oxford, 1881-1906, and the author of a History of England.

Bright, TIMOTHY (c. 1551-1615). Inventor of a system of shorthand. Educated at Trinity College, Cambridge, in 1572 he was in Paris and escaped the S. Bartholomew Massacre of August 24 by taking refuge in the house of Sir Francis Walsingham. From 1586-90 he was physician to S. Bartholomew's Hospital. In 1591 he took orders and was presented to two Yorkshire rectories by Elizabeth I, to whom he had dedicated his famous treatise on shorthand, *Characterie*, in 1588.

Brightlingsea. Urban district and seaport of Essex, England. On the Colne estuary, 8 m. S.E. of Colchester, it is a limb of the Cinque Port of Sandwich. It is a yachting station, with boat-building yards. Pop. (1951) 4,502.

Brighton (formerly Bright-helmstone). County borough and perhaps the most popular seaside



Brighton arms

resort of Sussex, England. It is 50½ m. by the electric rly. S. of London. It occupies an elevated position on the S. slope of the South Downs and has about 5½ m. of sea front extending from Rottingdean to Hove. Frequent encroachments of the sea undermined the cliffs, but further inroads were guarded against by the erection of a great sea-wall with a maximum height of 60 ft.

Brighton's rise as a health resort was due to the writings of Richard Russell (1687-1759), a physician. During the 1780s what was little more than a fishing village became fashionable owing to its choice by the prince of Wales (later George IV) as the site for a summer residence, the Royal Pavilion.



Brighton, Sussex. Holiday-makers thronging the beach of this favourite south coast resort

With the opening of the rly. from London in 1841, Brighton became one of the most popular of British resorts. There are many churches, the majority (but not the old parish church of S. Nicholas) dating from the 19th century. Among the principal buildings are the town hall, which includes a public library and picture gallery. Near the sea front is the aquarium, opened 1872 and rebuilt 1929. It has a ballroom as well as housing tanks of living fish.

Educational establishments include Brighton College and Roedean school for girls. There are municipal schools of art and of science and technology. The historic Royal Pavilion, a building of Indo-Chinese design, with domes, minarets, etc., was begun in 1784 and finished in 1822. Here George IV when prince regent held court for many years. It was purchased by the town commissioners in 1850 for £50,000, and the royal stables, known as the Dome, were converted into a concert hall. The whole range of buildings comprises an ideal social centre for the town.

The Regency quarter of Brighton contains many fine terraces, squares, and crescents. There are numerous hotels and modern blocks of flats. Of two promenade piers, the West Pier (1866) is 1,200 ft. long, and the Palace Pier, opened in 1901, is 1,710 ft. long; the latter replaced the old Chain Pier washed away in 1896. Preston Park and Queen's Park are spacious recreation grounds and the Kemp Town racecourse is the property of the borough. Made a parl. bor. in 1832, a mun. bor. in 1854, and a co. bor. in 1888, Brighton became two bor. constituencies under the 1948 redistribution. It has theatres, dancing, riding, and ice-skating, as well as the usual games, and there

is excellent walking country on the Downs E. and N. Thackeray was the first to refer to the town as "Dr." Brighton. Pop. (1951) 156,440. Consult Brighton, O. Sitwell and M. Barton, 1935; Brighton, Old Ocean's Bauble, E. Gilbert, 1954.

Brighton Trunk Murders.

Two murders committed at Brighton in 1934 within a few weeks in each of which the body of a woman was found dismembered in a trunk. Neither crime was solved. The first trunk was deposited on Derby Day 1934 in the cloakroom at Brighton station where it was discovered 11 days later; it contained the torso only of a woman probably aged about 25. Next day, as a result of a search that was made, a suitcase containing the legs was discovered at King's Cross. The identity of the murdered woman was never discovered. A month later another trunk containing the body of a woman was discovered also at Brighton; she was soon identified as Violet Saunders, known as Violette Kaye. No connexion between the two murders was ever established.

Bright's Disease. Popular general term for acute or chronic inflammation of the kidney, so called after the doctor, Richard Bright (1789-1858), who first described it. The acute form may be due to exposure to cold and wet; to tonsillitis and pharyngitis, measles, or diphtheria; and it may arise during pregnancy and chronic diseases like gout or diabetes. The acute form has an abrupt onset, with puffiness of loose tissues, such as are found at the eyelids and ankles, fever, pain in the back, and vomiting. The urine is diminished in quantity or may be suppressed altogether. It is generally dark in colour owing to the presence of blood, and contains albumen and casts of the kidney tubules.

Treatment consists of rest and warmth, and in encouraging the bowel and skin to take on the work of the suffering organ. Fluids, rendered bland and alkaline, are given; unless toxic products are being retained in the blood stream, protein foods are not withheld.

Chronic Bright's disease shows two pathological types of kidney: the large white and the small red, which names are commonly used to describe the two sub-divisions of the disease. The large white kidney is nearly always found in the large white patient, and it may follow on the acute form of Bright's disease described, or may present itself insidiously. Dropsy is a prominent feature of this type and often involves the whole body. Vomiting and diarrhoea are commonly present. The retina of the eye is affected and vision is impaired. The urine as a rule is diminished in quantity, for the damaged kidney is an inadequate filter. Kidney debris and albumen further indicate damaged kidney tissue. The condition is improved by treatment, but complete cure is not likely.

The small red kidney type of Bright's disease may likewise supervene on the acute phase. Its onset is insidious, and the condition may be present long before it is recognized. Thirst and increase in the quantity of urine passed may call attention to it. These symptoms obtain because the damaged kidney drains from the blood stream fluid which it would normally conserve in the vessels. Some albumen will certainly be present. Anæmia and loss of strength may cause the patient to seek medical advice as may headache and disorders of vision. Complete cure is unlikely, though a modified way of living is compatible with long years of successful work.

Brigid (452-523) Irish saint. Born at Faughart, near Dundalk, of noble ancestry, she became a nun and founded an oratory at Cill-Dara which developed into two important abbeys and later into the cathedral city of Kildare. The friend of S. Patrick, she is with him a patron saint of Ireland, and her festival is kept on Feb. 1. The name is often abbreviated to Bride and spelt wrongly Bridget. See Bridget.

Brihaspati. One of the gods of Brahmanism, regarded especially as the Lord of Prayer. A reference in the Mahabharata suggests that he may also be the god of wisdom.

Brihuega, BATTLE OF. British defeat, Dec. 9, 1710, by the French during the War of the Spanish Succession. From Madrid General Stanhope and his Austrian allies found it necessary to fall back into Catalonia. Marching separately the British reached Brihuega, a little town on the Tajuana, about 50 m. N.E. of Madrid. So rapidly, however, had the French followed them that the town was at once assailed. The walls and gates were blown down, and after the English had exhausted their powder and had taken to the bayonet, Stanhope at last surrendered.

Bril. The surname of two brothers, Paul and Matthys, Flemish artists. Matthys, born at Antwerp in 1550, went to Rome c. 1570 and was commissioned to paint ten frescoes for the Vatican galleries. He died in Rome June 8, 1583. Paul, born at Antwerp in 1554, followed his brother to Rome in 1574. He is notable as one of the earliest painters of landscapes: e.g. six of his frescoes in the Vatican, completed c. 1602. From 1614 he introduced animals, biblical and mythological subjects into his landscapes. He died in Rome Oct. 7, 1626.

Brill (*Psetta laevis*). Kind of fish related to the turbot but smaller and more oval in shape and inferior in the quality of its flesh. It is greyish brown in colour, with



Brill. A fish related to the Turbot
Berridge

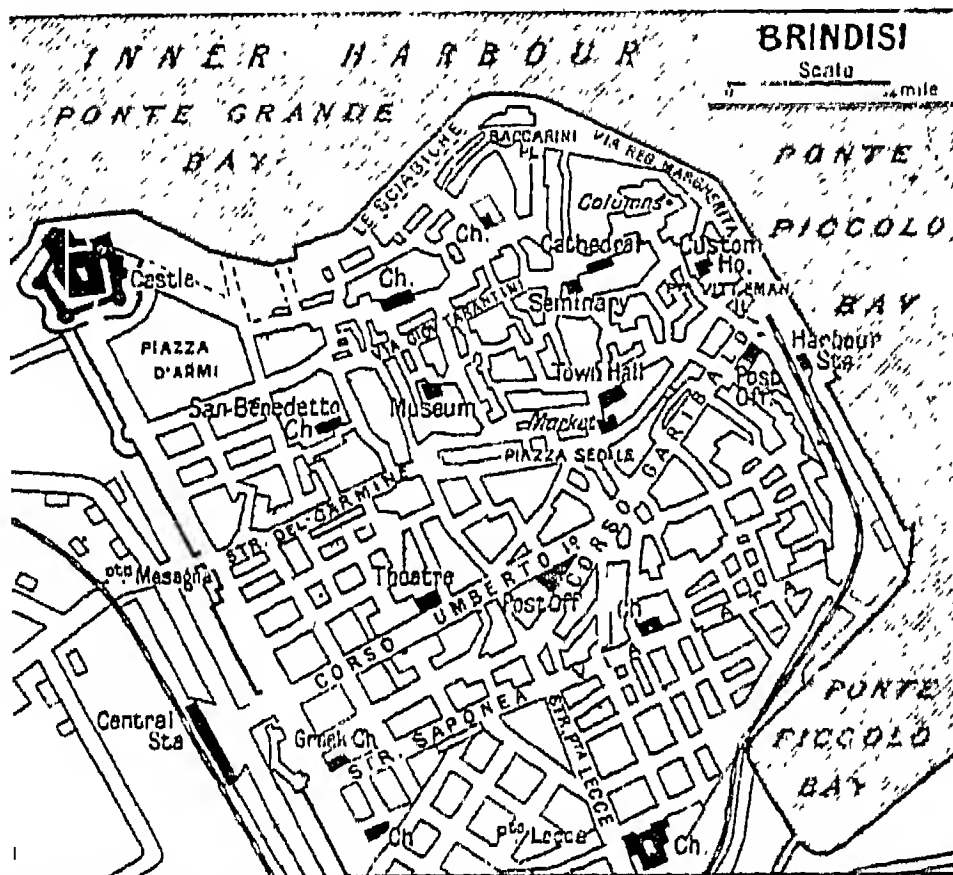
reddish spots, and is caught in British and other European waters.

Brilliant Green. Tri-phenyl methane dyestuff, used in medicine as an antiseptic and disinfectant either in solution or as an ointment. The antiseptic action is similar to that of acriflavine.

Brimstone (Old Eng. *brenston*, burnstone). Popular name for sulphur, also used by the alche-

mists, who looked upon sulphur as the principle of combustibility. The name chiefly survives in connexion with "brimstone and treacle," a popular confection for purifying the blood. See Sulphur.

Brin, BENEDETTO (1833-98) Italian statesman. Born at Turin.



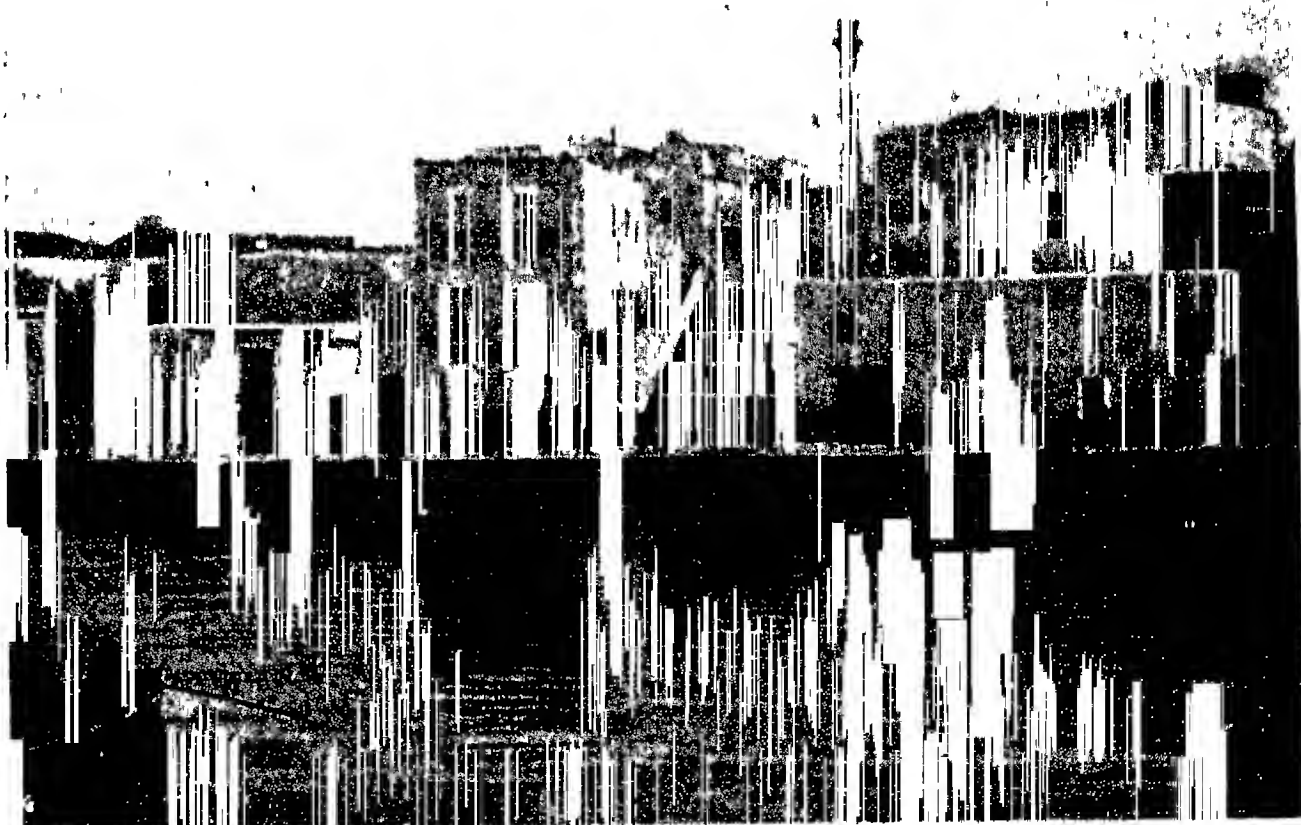
Brindisi, Italy. Map of town and harbour of the land terminus of the overland route to India

the Itaha, 15,654 tons, and encouraged the construction of private shipyards and engineering works. He died May 24, 1898.

Brindaban. Town of India, in the Muttra (or Mathura) dist. of Uttar Union. On the Jumna, 6 m. N. of Muttra, it contains many temples, shrines, bathing tanks, and ghats, and is a great pilgrimage place, being visited annually by thousands of Hindu pilgrims. Pop. (est.) 20,000.

Brindisi (Gr. Brentedion; Lat. Brundisium). City, seaport, and archiepiscopal see of Italy, capital of Brindisi prov. On the Adriatic, 473 m. S.E. of Bologna, it has been a starting point for the E. from earliest times, and was the principal naval station of the Romans on the Adriatic. From the opening of the Suez Canal until the Second Great War it was important as the port for the shortest sea route to India. The withdrawal of the British from India and the development of air travel greatly reduced the importance of Brindisi.

The town lies between the two arms of a harbour, is accessible to large vessels, and sheltered by small



Brindisi. Panorama taken from the harbour of this Southern Italian port. The marble column seen in the background is said to mark the end of the Via Appia

he was a naval engineer until 1873, when he became under-secretary of state in the ministry of marine.



Benedetto Brin,
Italian statesman

as the Dandolo, 12,265 tons, and

He was minister of marine 1876-78, 1881-91, and 1896-98, and foreign minister 1892-93. He greatly developed the Italian navy, designed various types of warship, such

islands. It is a wireless, maritime command, air mail, and torpedo station, and carries on much foreign trade, oil, wine, dried fruits, coral, and silk being the principal exports and coal the chief import. The most important buildings are the cathedral, built 1089 and restored 1749, after having been almost destroyed by earthquake; the massive castle built by the emperor Frederick II, now a prison; the 11th century baptistery of S. John, which houses a museum; and San Benedetto, a Norman church dating from c. 1200, with fine cloisters.

Brundisium was first colonised by Tarentum and in 245 B.C. by Rome. It formed the termination of the Appian Way, two antique columns on the quay being said to mark that point. Occupied by Pompey and besieged by Caesar 49 B.C., it was destroyed by Louis of Hungary in A.D. 1348 and greatly damaged by a severe earthquake in 1458. During the Second Great War British troops occupied Brindisi without opposition Sept. 11, 1943. Pop. (1951) city, 58,882; prov., 309,021.

Brindle, ROBERT (1837-1916). English R.C. prelate. Born at Liverpool and ordained at the English college, Lisbon, in 1862, he became an army chaplain in 1872 and was in the Egyptian campaigns of 1882-86 and 1896-98. For his services at Atbara and Khartum he received the D.S.O., being the first army chaplain to be so decorated. Auxiliary bishop in 1899 to Cardinal Vaughan at Westminster, he was translated in 1901 to Nottingham. He died June 22, 1916.

Brindley, JAMES (1716-72). British engineer. Born at Thornssett, near Chapel-en-le-Frith, Derbyshire, the



James Brindley,
British engineer
Engraving by J. T.
Wedgwood

son of a small farmer, he was apprenticed to a millwright at Sutton, near Macclesfield. Owing to his aptitude for mechanical work he was given charge of his master's shop until, in 1742, he set up in business for himself at Leek. Employed by the Wedgwoods to repair and construct machinery, he patented an improved steam engine in 1758. The following year he planned for the duke of Bridgewater the important waterway known as the Bridgewater Canal, from Worsley to Manchester, including the aqueduct which formerly carried it over the Irwell. The extension of the Bridgewater Canal to the Mersey, and the Trent and Mersey, or Grand Trunk Canal, were also his work. Most of Brindley's calculations were done mentally, as he wrote with difficulty. He died Sept. 30, 1772.

Brinell Hardness. The Brinell test for the hardness of a metal consists of forcing a hardened steel ball into its flat surface under a predetermined load, the diameter of the impression formed being measured and the Brinell

hardness value obtained from tables. If B.H.N. is the Brinell Hardness Numeral, P is the applied load in kilograms, D is the diameter of the steel ball in millimetres, and d is the diameter of the impression in millimetres, then

$$\text{B.H.N.} = \frac{P}{\frac{\pi D}{2}(D - \sqrt{D^2 - d^2})}$$

A standard ball of 10 mm. diameter and a load of 3,000 Kgs. is used for hard metals such as steels, but for soft metals a load of 500 Kgs. only is used. Materials above a certain hardness value deform the ball indenter and make the measurements inaccurate. See Diamond Hardness; Vickers Hardness.

Brink, BAREND TEN (1841-92). Dutch philologist. Born at Amsterdam, Jan. 12, 1841, he was the first professor of the English language at Strasbourg, where he died Jan. 29, 1892. His unfinished History of English Literature, Language and Metre of Chaucer, and Five Lectures on Shakespeare have been translated into English.

Brinon, COMTE FERDINAND DE (1892-1947). French politician executed as a traitor. Proprietor of a paper in Vörsbach, Germany, in 1933 he had an interview with Hitler. In 1934 he founded the Committee France-Germany. Sent on a secret mission to Berlin in 1938 by G. Bonnet (*q.v.*), he was expelled from France shortly afterwards. In the Second Great War he returned to France from Brussels with the German invaders, and in 1940 was appointed Vichy ambassador to the Germans in Paris. After the Allies invaded France in 1944 he fled to Germany with Laval. Brinon was captured near Lake Constance by the French 1st army May 11, 1945, was tried, found guilty of collaboration, and executed at Fort Montrouge April 15, 1947.

Brinsmead, JOHN (1814-1908). Founder of a British firm of pianoforte makers. Born at Wear Gifford, Devon, Oct. 13, 1814, he was trained as a cabinet-maker. In 1835 he went to London, founding his firm in 1836, and opening premises in Wigmore Street in 1863. He died Feb. 17, 1908. In 1923 the firm moved to Cavendish Square, London, W.1.

Brinvilliers, MARIE MADELINE MARGUERITE, MARQUISE DE (1632-76). French poisoner. She was the daughter of Dreux d'Aubray,

civil lieutenant of Paris, and was married in 1651 to the marquis de Brinvilliers. Introduced to Godin de Sainte-Croix, a cavalry officer, she became his mistress in 1659. D'Aubray, to stop the scandal, had Sainte-Croix imprisoned in the Bastille on a *lettre de cachet*; there he acquired the art of poisoning from an Italian, and on his release persuaded the marquise to poison her father. Sainte-Croix proposed the further death of her two brothers in order that he and his mistress might inherit the whole of the family wealth, and the crimes were duly carried out.

Although the cause of death was revealed at the post-mortem examinations, no suspicion fell on the murderers. Sainte-Croix died suddenly in 1672, and among his papers was a document incriminating the marquise, who fled to Germany and thence to a convent at Liège. A police officer, disguised as an abbé, persuaded her to leave with him, and she was taken to Paris. After attempting to commit suicide, she was beheaded and her body burnt, July 16, 1676. A full confession of her crimes was found among her papers.

Brioni. Group of small islands in the Adriatic, off Pola. They were the scene of the naval victory of the Genoese over the Venetians, 1379. Much of the building stone used for the Venetian palaces came from Brioni.

Briquette (Fr., little brick). Coal crushed and powdered, or used in dust form as obtained from the pit, then compacted into "brick" form with or without some organic cinder such as pitch. Besides the rectangular shapes, briquettes are made in "ovoids," mainly for burning in domestic grates. Both anthracite and the more volatile coals are briquetted. The latter can be formed without a binder, by heavy pressure alone. Binders of inorganic material such as Portland cement leave more ash. Briquettes are extensively used in France in industrial furnaces and locomotive and marine boilers. In Great Britain they are normally confined to domestic grates. During the Second Great War, however, British railways burned large numbers of briquettes made from coal dust normally rejected as waste. See Fuel.

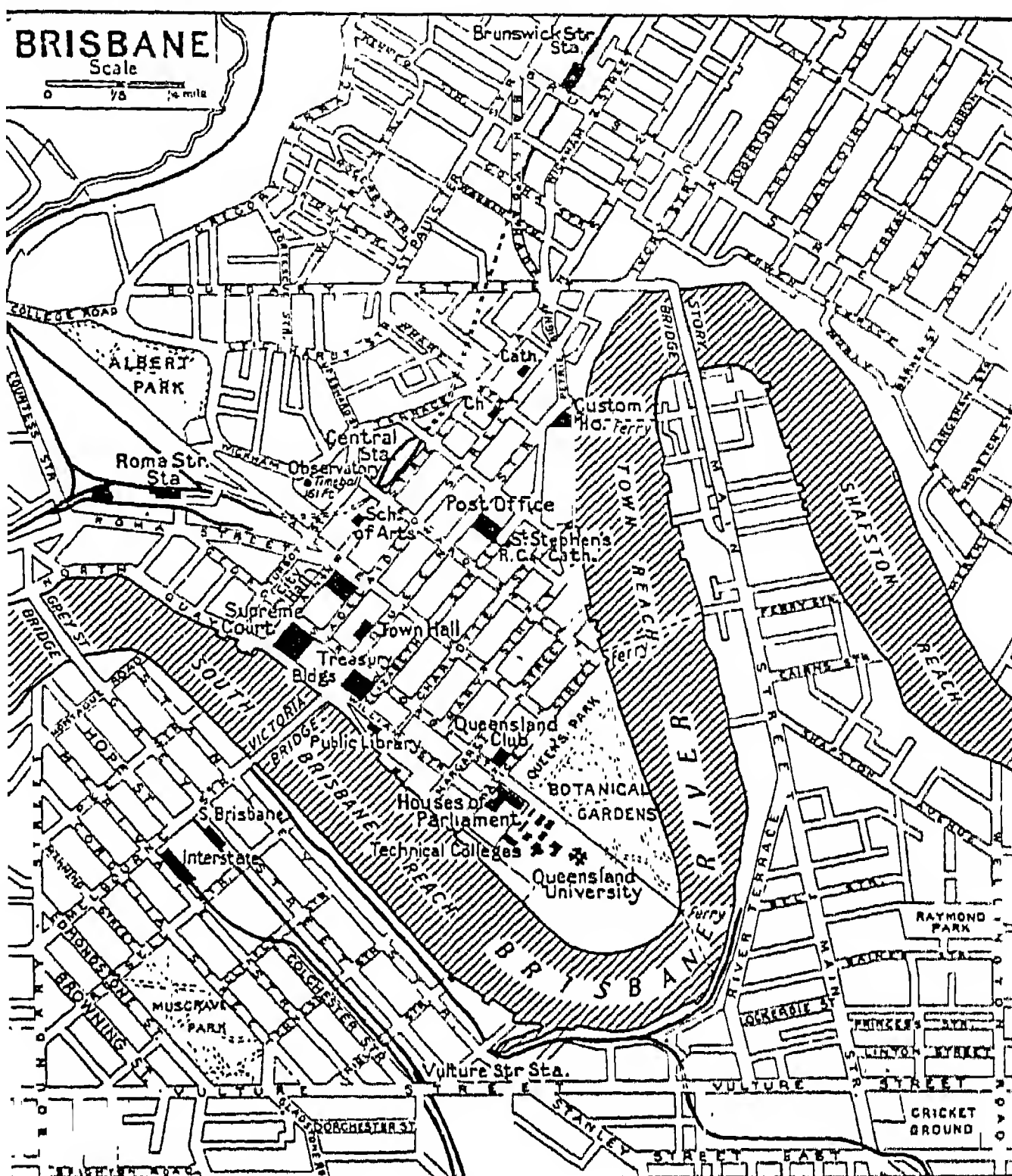
Brisance (Fr. *briser*, to break). Intensity of action of high explosives when detonated without being confined. The time required for complete chemical decomposition

is a most important factor in influencing the brisance of any explosive. If a slow explosive, such as gunpowder, is fired unconfined on a steel plate, the gases are developed so slowly that they merely displace the surrounding air and the plate is unaffected; but with high explosives such as trinitrotoluene reaction occurs at such a high speed that tremendous pressure is developed before the air has time to move, and the plate is deformed or ruptured.

Brisance is an important factor in determining the suitability of an explosive for disruptive use, *e.g.* for demolition. Brisance is usually determined by the crushing effect of an unconfined cartridge on a lead or copper cylinder as measured by a brisance meter.

Brisbane. Principal seaport, chief commercial centre, and capital of Queensland, Australia. On the Brisbane river, 15 m. above its mouth on Moreton Bay, it occupies an area of 385 sq. m. It has rly. connexion with Melbourne, Adelaide, Sydney, and Perth, and is accessible to ocean-going vessels of up to 25,000 tons. There are extensive wharves on both sides of the river, which is here spanned by three bridges. Principal exports are sheep, wool, dairy produce, sugar, canned fruits, timber, and meat; principal imports clothing, machinery, motor cars and other manufactures, and petrol. There are meat processing works. Pop. (1954) 501,871.

The seat of an R.C. archbishopric and an Anglican bishopric, Bris-



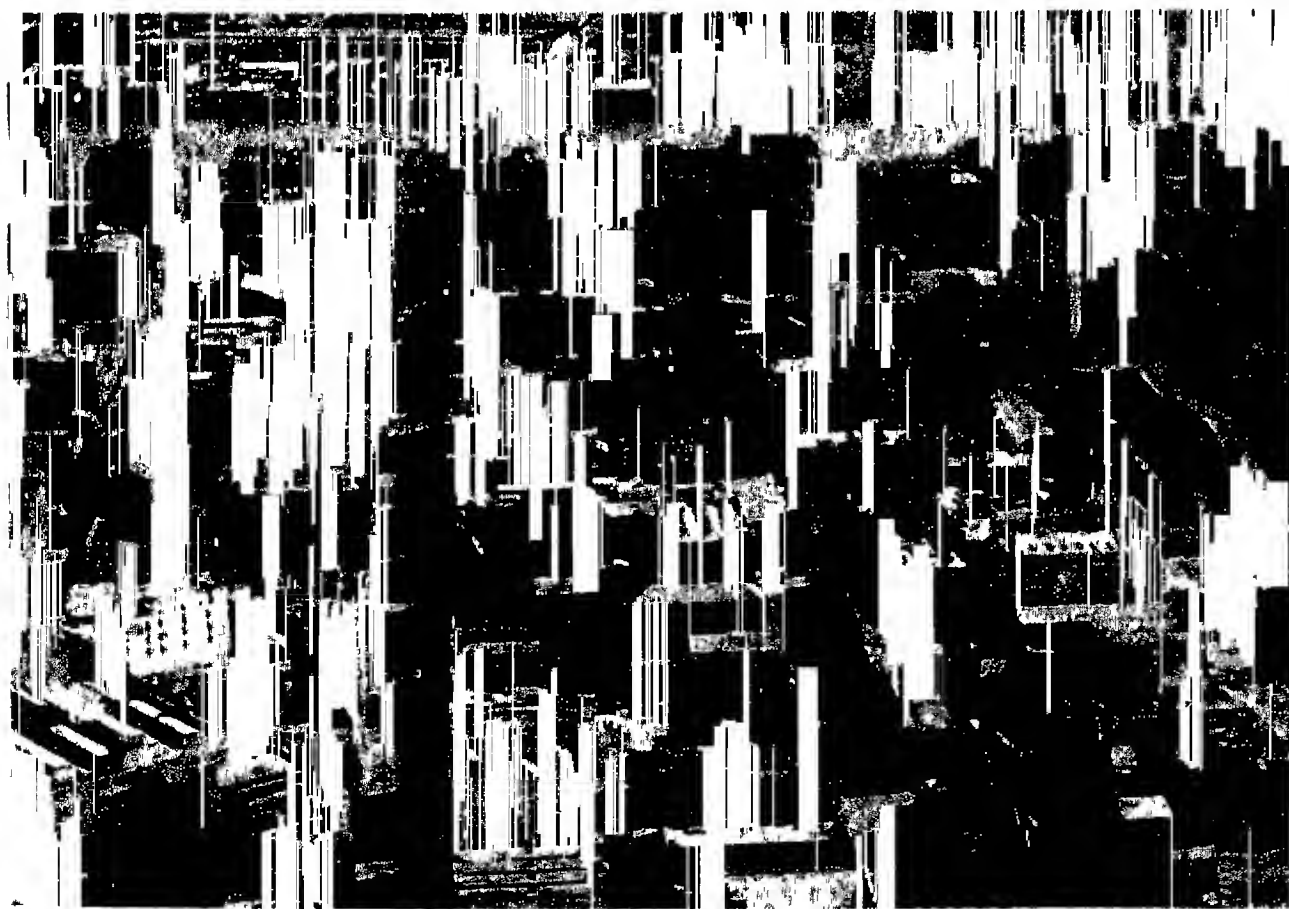
bane possesses two cathedrals, a parliament house, custom house, state treasury, supreme court, city hall (one of the finest pieces of Australian architecture), and museum. It is the seat of the University of Queensland, established 1909. There are botanical gardens, parks, and a fine aerodrome.

Most of the residents live in detached houses. Roses bloom all the year and flowering trees make city and suburbs a blaze of colour. The mountains and foothills that form Brisbane's background add to the beauty of the city.

The most equable in climate of Australian capitals, Brisbane has average max. temp. 78° F., min. 59° F., annual rainfall 45 ins. Its dry, sunny winter weather makes it a favoured winter resort.

The discovery of the site on Sept. 28, 1824, is commemorated by an obelisk on Coronation Drive. It was occupied as a penal station during 1824-39 by Sir Thomas Brisbane (1773-1860) after whom it was named, was opened to free settlement in 1842, and in 1859 became the colony's capital. In 1839 South Brisbane was almost wholly destroyed by a flood.

Brisbane, SIR CHARLES (1768-1829). British admiral. He entered the navy at the age of ten, served under Nelson, 1793, and received his first command 1794. In 1795, acting without orders, he abandoned a convoy under his command and hastened to the Cape of Good Hope to give warning of the approach of a Dutch squadron, an



Brisbane. The capital of Queensland is a well-planned city, with many buildings of skyscraper height. The bridge seen here is the Victoria Bridge
Photo, Australian News and Information Bureau

action approved by the Admiralty. From 1809 until his death, Brisbane was governor of the island of St. Vincent. Knighted in 1815, and promoted admiral 1819, he died in Dec., 1829.

Briséis. In Greek legend, a maiden who became the cause of the quarrel between Agamemnon and Achilles during the Trojan War. Achilles had captured another maiden, Chryséis, daughter of a priest of Apollo; Chryséis fell to Agamemnon's share of the plunder; Apollo, resenting the insult to his priest, sent a plague on the Greek camp. Agamemnon returned Chryséis to her father but demanded Briséis in her place. Achilles gave Briséis up, Agamemnon being in supreme command; but Achilles sulked in his tent, only emerging to fight again after Hector had killed his friend Patroclus.



Jean Pierre Brissot, French revolutionary

Brissot, JEAN PIERRE (1754-93). French lawyer and revolutionary, leader of the Girondins. Born at Chartres, Jan. 14, 1754, and trained as a lawyer, he was

the author of two important treatises on criminal law, published 1780. Imprisoned for four months in the Bastille, as the supposed author of a pamphlet against Marie Antoinette, on his release he went for safety to England, but returned to France in 1789 and took part in the storming of his former prison. Elected to the legislative assembly in 1791, he became leader of the republican Girondins, sometimes called after him Brissotins. As a member of the committee for foreign affairs, Brissot fell under suspicion for his moderation, and was accused of befriending royalty. An enemy of Robespierre, he was one of the first Girondins condemned and guillotined, Oct. 31, 1793.

Bristle Tail. Wingless insect of the order Thysanura, so-called from the presence of two long processes at the hind end of the body. It is up to an inch long with biting mouth parts and is often covered with brownish or silvery scales. Most species live in litter, feeding on plant detritus; others (*Petrobius*) live on the seashore in rock crevices; the silver fish (*Lepisma saccharina*) and the firebrat (*Thermobia domestica*) are commensals of man. The silver fish is very common in houses in Great Britain.

Bristol. City and co. borough, astride the river Avon, mainly in Gloucestershire but partly in Somerset, England; also co. of itself. A cathedral and university city, a seaport, and a manufacturing and commercial centre forming six borough constituencies, it is 118 m. W. of London. It is well served by railway and has an airport at Whitchurch, 3 m. from the city centre. Pop. (1951) 442,994.

Bristol has an exceptional variety of industries, of which aircraft construction has outstripped all others; motor and general engineering is important; tobacco, chocolate, soap, paints, and varnish are made; and there are printing works.

Bristol bishopric, created in 1542, was incorporated in that of Gloucester during 1836-96. Little of the early part of the cathedral (originally the abbey church of S. Augustine) remains except the chapter house and gateway. S. Mary Redcliffe, a noble building of Perpendicular design, has associations with the poet Chatterton, who was born in Bristol and whose statue is in the churchyard; and Southey and Coleridge were married here to the sisters Fricker. S. Mark's chapel, founded c. 1220, was purchased by the corporation from Henry VIII and became the mayor's chapel c. 1720.

Red Lodge, a 16th-century mansion with beautiful interior carving, is the meeting-place of the Bristol Savages. The chapel of the Three

Kings of Cologne, a 15th-century almshouse foundation, stands at the top of Christmas Steps. S. John's church and arch are the only existing original city gate. Wesley's first chapel is in Broadmead. The Theatre Royal, King Street, controlled by the Old Vic (London), dates

from 1766. Other buildings include the University with its commanding tower, Victoria rooms, Royal West of England Academy (which houses a thriving school of art), the Guildhall (badly damaged in air raids during the Second Great War), the central library, museum, and art gallery, and the exchange, an 18th-century Classical building designed by Wood of Bath. Clifton College is near Durdham Down.

The principal open spaces are Clifton and Durdham Downs, overlooking the Avon gorge on the N., and Leigh Woods on the S. On the river bank below is Hotwells, famous in the 18th century for its spring waters. On the edge of the Downs are the zoological gardens.

The port of Bristol, comprising the City docks, Avonmouth and Royal Edward docks, and Portishead docks, is owned and run by



Bristol arms



Bristol and its environs. Map showing the river Avon and the great port of Bristol, owned and administered by the corporation



Bristol: notable buildings which escaped extensive damage in the air raids of 1940-41. 1. Norman gateway to the cathedral close. 2. Central tower of the cathedral, formerly known as the church of S. Augustine's Abbey. 3. General view of the city from the Cabot Tower. 4. Cabot Tower, built 1897-98, to commemorate the expedition from Bristol of John Cabot to the mainland of America 400 years earlier

the City corporation. The City docks, the oldest, have a quay length of 18,900 ft. and water area of 82 acres. An extensive trade with the Continent and with Ireland and a large coastwise trade is carried on at these docks. Avonmouth docks, 7 m. N.W. of the city centre on the Gloucestershire side of the Avon estuary, handle most of the overseas trade; the original dock here was opened to traffic in 1877; the Royal Edward dock in 1908. These docks have a length of quay of 17,120 ft. and cover a water area of 94 acres; they are well equipped for handling all classes of cargo.

Principal Items of Trade

Avonmouth's principal imports are grain, petroleum, animal feeding stuffs and oilseeds, fertilisers, ores and concentrates, timber, metals, frozen meat, provisions, paper and wood pulp, fruit, cocoa, tea, tobacco, and wines and

spirits. Principal exports are petrol, china and ball clay, machinery and engineering equipment, painters' colours, prefabricated buildings, motor vehicles and tractors, and chemicals.

The Portishead dock, on the Somerset side of the estuary, has 3,900 feet of quay and a water area of 16 acres; it imports coal for the dockside generating station, and timber, mainly from Europe.

The port of Bristol has excellent rail, road, and water connexions with southern England, South Wales, and the Midlands. Approximately seven million tons of cargo pass through it annually.

HISTORY. Bristol was a royal borough before the Norman Conquest, and of the men of Bristol it has been said, "They girdled the world with their ships, they discovered continents, they peopled strange lands, and fixed the destinies of generations yet unborn." The earliest evidence of the city's

existence is provided by two silver coins of Ethelred II, "the Unready" (978-1016), coined at Bric—an abbreviation of Briegstowe (the place of the bridge), an early form of the city's name. The Normans strengthened its defences and built a castle, replaced in 1126 by the lofty keep built by Robert, earl of Gloucester. Stephen and Edward II were imprisoned here. Cromwell demolished it after the Civil War.

Bristol made a County

As a reward for assistance from Bristol's mariners and traders in supplying ships and men for the invasion of France, Edward III in 1373 granted Bristol a charter constituting the borough an independent county with shire jurisdiction. Its trade flourished under the Lancastrian kings. The munificence of the wealthy merchant adventurers survives in many charitable foundations and churches. Most of the

churches in the city centre date from the 15th century. Cabot Tower, on Brandon Hill, was erected on the 400th anniversary of the historic voyage to N. America of John and Sebastian Cabot in 1497.

With the discovery of the West Indies and the growth of the American colonies Bristol became the chief link between England and the New World; the Merchant Venturers, chartered in 1551, did much to develop trade. During the Civil War, Bristol was captured by Prince Rupert, July 26, 1643, and retaken by Fairfax, Sept. 10, 1645. In the early 19th century the port declined owing to the loss of the American colonies and the abolition of the slave trade for which Bristol was the chief English centre. The Great Western, first steamship to be built for trans-Atlantic trade, was launched here in 1838; but revival came only with the building of new docks at Avonmouth and Portishead (*v.s.*).

The city suffered severely in German air raids during 1940-41, and many historic buildings were bombed. More than 3,000 houses were destroyed, and some 90,000 properties damaged. Total casualties were 1,299 killed; 3,305 seriously injured. Consult Bristol under Blitz, T. H. J. Underdown, 1942; The City and County of Bristol, Bryan Little, 1954.

Bristol, UNIVERSITY OF. Institution chartered in 1909. A medical school was founded in Bristol in 1833, and a university college in 1876; these merged in 1893. In 1909 the college was dissolved, and the university received its charter. Generous benefactors, especially members of the Wills family, gave large sums of money for its equipment and endowment, and the main buildings were opened in 1925. The university has five faculties, arts, science, medicine, engineering, and law. Its degree courses include domestic science and veterinary science. It also gives diplomas, testamurs, and certificates in various branches of study, particularly social studies, *e.g.* child study, public health, psychological medicine. It has an agricultural and horticultural research station at Long Ashton.

Bristol. City of Connecticut, U.S.A., in Hartford co. Standing on the Pequabuck river, 14 m. S.W. of Hartford, it is served by the New York, New Haven, and Hartford Rly. It has a clock-making industry dating from 1790; hardware and metal goods are made. Pop. (1950) 35,961.

Bristol. Borough and port of entry of Rhode Island, U.S.A., the co. seat of Bristol co. On Narragansett Bay, 12 m. S.E. of Providence, it has a good harbour and shipbuilding yards, cotton and woollen mills, and rubber factories. It began to make racing yachts in 1863. Bristol, incorporated in 1681, has many buildings dating from Colonial days, and a museum with Indian relics. Pop. (1950) 10,335.

Bristol, JOHN DIGBY, 1ST EARL OF (1580-1653). English diplomatist, a rival of Buckingham. A courtier in 1605, and knighted in 1607, he was ambassador for James I at Madrid, 1611-14, chiefly in connexion with the proposed marriage of the Prince of Wales to the Infanta Maria. He was created Baron Digby in 1618 and earl of Bristol in 1622. His opposition to the favourite Buckingham and his later adherence to Charles I in 1642 resulted in his suffering a short imprisonment in the Tower of London. One of the would-be reforming peers who treated with the Scots at Ripon in 1640, he took the king's part and fought at Oxford and Edgehill. He retired to Exeter in 1644, and when that city fell to Fairfax in 1646, Bristol was ordered to leave the country. He died in exile in Paris, Jan. 16, 1653.

Bristol, GEORGE DIGBY, 2ND EARL OF (1612-77). English Royalist courtier and commander. The eldest son of the first earl, he was born in Madrid, and became M.P. for Dorset in 1640. He was on the committee for the impeachment of Strafford, but, after advocating



The 2nd Earl of Bristol

the prosecution, voted against Strafford's attainder. Digby became an intimate adviser of King Charles, and urged the arrest of the five members. He was made secretary of state, a privy councillor, and high steward of the University of Oxford in 1643, lieutenant-general of the forces N. of the Trent in 1645. Defeated at Carlisle, he escaped to Ireland. On the surrender of the army to parliament Digby fled to France, and became a lieutenant-general in the French army, but intrigued against Mazarin and was ordered to leave the country. He succeeded to the earldom in 1653. After the Restoration he attacked Clarendon

and, though a Roman Catholic, he supported the Test Act. He died March 20, 1677.

Bristol Bay. Arm of Bering Sea, N. of the peninsula of Alaska. It receives the waters of the Nushagak, and is an important salmon-fishing area.

Bristol Channel. Largest inlet of the British Isles. An arm of the Atlantic Ocean, it separates S. Wales from the English counties of Devon and Somerset. It extends for c. 85 m., from the estuary of the Severn to St. George's Channel, has a breadth varying from 5 m. to 43 m., and an extreme depth of 40 fathoms. It has very high tides—as much as 35 ft. at Bristol—and their meeting with the outcoming waters of the Severn produces bores and rollers up to 9 ft. in height. Carmarthen and Swansea Bays are on Bristol Channel, which receives, besides the waters of the Severn, those of the Usk, Wye, Bristol Avon, and many smaller rivers.

Bristol Ware. Delft-like ware peculiar to the city of Bristol. Though pottery was made at Bristol at least as early as the reign of Edward I, it was not until 1690 that a fine delft-like ware was produced. This had a heavy, opaque body, and was decorated in white and bluish green on a greenish white ground. During 1750-79 Bristol porcelain, in which "soaprock of Cornwall" was used, had a white, semi-transparent body.

Britain (Lat. Britannia). Name for England, Wales, and Scotland together. By extension, it is sometimes used for the British Isles as a whole, and for the United Kingdom of Great Britain and Northern Ireland. The word Britain is Celtic; the earliest recorded instance of its use is by the Greek explorer Pytheas, who visited Britain—the Pretannic Isles—c. 320 B.C.

PREHISTORIC BRITAIN. The story of very early Britain is that of a peninsula into which came successive waves of immigrants from the interior of the Continent and of their reactions upon one another and gradual fusion. Palaeolithic man dwelt in Britain between the periods of major glaciation of the Ice Age, and his stone implements have been recovered all over the southern half of the island. Even in this remote period the inhabitants seem to have been of mixed origins, for there are traces of different cultural groups which were probably those of distinct peoples. After the ice cap receded from Britain, perhaps

12,000 years ago, Mesolithic man slowly adapted himself to the changed conditions of life. It was in the Mesolithic age, c. 8,000 years ago, that the sea broke through the neck of land in the south-east, and Britain became an island.

With the Neolithic age (c. 2500 B.C.) fresh people made their way into Britain from the east (Peterborough culture) and from the south (Windmill Hill culture). The chief remains of the period are the dwellings of the dead, the long barrows of the south of England and the chambered megalithic tombs of the western and northern parts of the British Isles, tombs with passages and compartments of large stones whose quarrying and erection must have greatly taxed the powers of primitive man. The great revolution of the age was the introduction of agriculture. Man now tilled the fields with a primitive hoe, and this meant the adoption of more settled habitations, where the making of pottery and other domestic skills developed.

Bronze and Iron Ages

The next important immigrant group was the Beaker people, so-called from their characteristic type of pottery. They were invaders of mixed origin who arrived from the east c. 1900 B.C. and who were the first representatives in Britain of the Indo-European peoples. The Beaker folk pressed the skill of the megalithic builders into the service of their grandiose religious conceptions, which found expression in such great sanctuaries as Stonehenge, Avebury, and the more northern circles of Keswick and Arbor Low. By means of the Beaker people, with their widespread connexions on the Continent, the use of metals filtered into Britain, and the British Bronze Age began (c. 1800 B.C.). The Early and Middle Bronze Ages were on the whole a period of fusion and development. The introduction of a simple plough helped agriculture, which was also favoured by the warm climate the island enjoyed during the second millennium B.C. Trade flourished, for Cornish tin was discovered and worked, and exchanged for the gold and gold ornaments of Wicklow, and for goods from farther afield—blue faience Egyptian beads have been found in the Wessex round barrows characteristic of the Bronze Age.

In the Late Bronze Age from c. 1000 B.C. a succession of fresh invaders, the Celts, made their way

into Britain. This Celtic element in the population was intensified at the beginning of the Iron Age. The Iron Age came later to Britain than to the continent of Europe. Iron was brought to Britain by the so-called Iron Age A people, the Hallstatt culture, who arrived c. 450 B.C. Iron Age B people arrived some time after 300 B.C. from the Seine and Marne region of northern Gaul, where the La Tène Celtic culture had reached great heights in the previous century. These Iron Age B folk were the most artistic of the Celtic groups which entered Britain and are represented by the chariot burials of the Parisii in Yorkshire. The Iron Age B was a period of recurrent tribal warfare, to which are due large numbers of the hill forts of Britain.

Arrival of the Belgae

Later came the Iron Age C folk, the Belgae, settling in south-east Britain from c. 75 B.C. Their greatest strength lay in the region of Hertfordshire. They brought with them a stronger plough, and began those changes in agriculture that the Romans were to continue, such as clearing the forest from some of the lowlands.

It remains to fit these peoples into what is known about the Celts from history and philology. The Celtic languages are divided into P and Q groups, the P-languages being the Brythonic tongues, Welsh and ancient Gaulish, the Q-languages being the Goidelic tongues (Irish and Scottish Gaelic). The first recorded visit to Britain is that of Pytheas (c. 320 B.C.), noted above, a Greek from Massilia (Marseilles). He found Pretanes, *i.e.* Brythonic-speaking Celts, already established. Presumably, then, the Iron Age A people were Brythonic and the peoples whom they pushed into the north or west or across the Irish Sea were already speaking a Celtic, Goidelic, language. So, as archaeological evidence agrees, Celts must have arrived in Britain during the Bronze Age, if, indeed, the Beaker people were not already speaking the language.

ROMAN BRITAIN. Britain was first brought definitely into the orbit of the civilized world by Julius Caesar who, in 55 B.C., turned aside from his Gallic campaigns to visit the island. His expeditions in 55 and 54 were merely military reconnaissances intended partly to overawe the natives, partly to see what were the prospects of a conquest. Caesar's picture of the Britons, fair-haired warriors with blue war-paint, their

wicker coracles, their primitive huts, their loose tribal organization, their human sacrifices, their dominant priesthood the Druids—an institution shared with the Gauls—is familiar. The Romans learnt that the light-armed Britons with their primitive war-chariots were no match for the heavy-armed, disciplined legionaries; but a century passed before Rome annexed Britain.

During this period the Britons fought continually among themselves, and the Belgae resumed their expansion, making Camulodunum (Colchester) their capital. A last Celtic group arrived after Caesar's wars—Venetic fugitives from Armorica (Brittany) who settled among the south-western tribes and introduced the formidable multiple ramparts of the last phase of such great hill-forts as Maiden Castle, Dorset. Their endemic warfare did not prevent the Britons from entering into trading relations with the Roman Empire through Gaul, and Roman products found their way with increasing frequency to the courts of British chieftains.

Roman Intervention

British disunity eventually brought about Roman intervention, on the pretext of restoring an exiled chief to power. The Roman army of conquest, led by Aulus Plautius, landed in A.D. 43, and was joined for a short time by the emperor Claudius in person. It met with stubborn resistance from Caratacus (Caradoc, Caractacus), whose father Cunobellinus (Shakespeare's Cymbeline) had won for himself the premier place among the chiefs of the south. Other Britons, jealous of the power of Caratacus, welcomed the Romans. Caratacus, driven from his own territory, roused the tribes of Wales to resist the invader, but was defeated and taken captive to Rome.

Southern Britain was rapidly pacified, but in A.D. 62, while the governor Suetonius Paulinus was campaigning in North Wales and Anglesey, the Iceni of East Anglia, under their queen Boudicca (Boadicea), rose and destroyed the Roman colony founded on the Belgic town of Camulodunum (Colchester), and the towns of Verulamium (St. Albans) and Londinium. The insurgents were crushed by Suetonius in a pitched battle. A period of consolidation followed before Agricola, governor of Britain during 77–83, established Roman rule as far north as the Tyne,

and conducted campaigns as far as Aberdeenshire.

The great Roman Wall from Tyne to Solway was built by the emperor Hadrian in about 122. It was held by a large garrison of auxiliary troops, distributed in forts. They were supported by the legions at York and Chester which controlled the hill-country of northern Britain and Wales. A third legion was stationed at Caerleon (Monmouthshire). During 137-142 the frontier was advanced to the Forth-Clyde line, but this advanced territory was abandoned half-a-century later, and in 210 Septimius Severus carried out extensive rebuilding along the wall built by Hadrian.

Roman Culture

The hill-country did not acquire more than a veneer of Roman culture; but the south-eastern, lowland areas of the island were rapidly Romanised, and, with the enforcement of law and order and the development of a good road system, many towns, planned in Roman fashion, developed. In the countryside farms prospered and more land was brought under cultivation. British wool and woollen garments were highly thought of. The mining industry, for lead, copper, and iron, was also of considerable importance. Romanised Britons took to building houses of brick or stone and providing them with baths, mosaic pavements, and the other amenities of Roman life. The native language nevertheless persisted, despite the widespread use of Latin, and many old Celtic deities continued to be worshipped until the establishment of Christianity in the 4th century.

In the 3rd century the south-east coast began to be disturbed by the raids of Saxon pirates. The answer to these was the system of Saxon Shore fortresses of which Rutupiae (Richborough) is the best known example. During 367-369 a combined invasion of Saxons, Picts (from Scotland), and Scots (from Ireland) brought devastation to the province; but it recovered and might have held together for a considerable time had it not been for the conflicts between rivals for the imperial throne which were tearing the Empire asunder and which several times denuded Britain of its garrison. The usurper Constantine III led his troops to the Continent in 407 and they did not return. In 410 the Britons were told by the emperor Honorius that they must

look to their own defences. They appear to have done so with some success at first, and in 427 they were still in communication with the Church in Gaul; but the Picts and Scots intensified their raids and life was no longer secure.

In the middle of the century—449 is the traditional date—the English tide began to flood the shores of Britain. Thenceforth for hundreds of years the histories of England, Wales, and Scotland are separate, and are so treated in this Encyclopedia.

The Roman occupation of Britain lasted nearly four centuries and left behind a rich legacy of remains. References to roads, monuments, towns, etc., will be found, with illustrations, scattered

through the pages of this Encyclopedia; see also under the names of Roman generals and British leaders and tribes.

Olwen Brogan

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BRITAIN, THE BATTLE OF: 1940

Captain Norman MacMillan, M.C., A.F.C.

A detailed account of one of the decisive battles of the Second Great War—the first defeat suffered by Hitler's armed forces. It was fought in the air above the English Channel and the fields of South-Eastern England from July 10 to October 31, 1940. Its outcome made impossible the contemplated invasion of England

The battle of Britain is the name given to the air action fought over the English Channel and (mainly) S.E. England after the defeat of France in June, 1940. Neither the beginning nor the end of the battle was clearly defined; but within the dates officially assigned to the action, July 10 to Oct. 31, 1940, decision was reached.

The German air fleets, the *Luftflottenkommando* 2 under Gen. Kesselring and the *Luftflottenkommando* 3 under Gen. Sperrle, faced the British Isles from Norway to the Bay of Biscay. At least three *Fliegerkorps*—the 1st, 2nd, and 8th—played a direct part in the battle of Britain. German air organization allowed for rapid transfer of operational units from one zone to another, and Germany could, and did, bring a large part of her total air strength of about 5,000 first-line aircraft into action.

At that period Great Britain stood alone. The assault was met by R.A.F. Fighter Command under Air Chief Marshal Sir Hugh (later Lord) Dowding. His command included Nos. 10, 11, and 12 fighter groups, the anti-aircraft artillery commanded by Lieut. Gen. (Sir) Frederick Pile, and the intelligence organization comprising the Royal Observer Corps and radiolocation and all their channels of communication. Between ground and aircraft there was radio-telephone communication, and pilots could also talk to one another. Air-

craft movements communicated by Intelligence were swiftly represented on table maps in the operations rooms of the c.-in-c. and of groups, sectors, and stations. Upon the basis of that information, swiftly conveyed, rapidly marshalled, counter-action was taken.

The Luftwaffe outnumbered the R.A.F. by four to one. Defence aircraft had therefore to be handled with a mixture of boldness and caution to ensure the fullest effect from every fighter. Fighter Command had been depleted by the air actions fought over the Low Countries and France; and in the midst of this anxious period fighters were in course of modification to give them greater speed and climb and quicker take-off.

Aircraft were disposed to meet the assault from whatever direction it might come, along the E. and S. coastlines and about the great cities. German bombers trying to make an undetected passage toward Merseyside far out above St. George's Channel were met and thrown back in disorder. But this dispersal of the defence meant that some squadrons could not be used against the main assault forces. The brunt of the battle was borne by No. 11 group, commanded by Air Vice-Marshal K. R. Park. This group was reinforced from Nos. 10 and 12 groups.

In 1939, Nos. 11 and 12 fighter groups possessed 37 fighter squadrons; after the battle the three

fighter groups (No. 10 became operational in July, 1940) possessed 51 squadrons, most of them, however, reduced to the status of training units.

Immediately after the defeat of the Low Countries and France the German high command seized all barges in those countries, which, added to barges commandeered in Germany, gave them a shallow-draught fleet, many thousands strong, of almost ready-made landing craft, suitable with slight alterations for discharging armoured fighting vehicles and self-propelled guns. This invasion fleet, gathered in ports from Amsterdam to Brest, became a target for the counter-attack by the R.A.F., whose bombers destroyed barges and dock installations, and disorganized ports.

During Continental fighting the Luftwaffe had closely preceded the army, blasting a way for it and acting as mobile "artillery" against strong-points when summoned by radio from ground forces. But close cooperative *blitzkrieg* tactics were difficult to apply against an island. The German high command therefore decided that the Luftwaffe should operate by itself to destroy the R.A.F. and so clear the way for the invasion fleet carrying the German army against Great Britain. The further course of the war therefore hinged upon the result of this great strategic air battle, the first the world had ever seen.

German bombers and fighters flew in formations larger than

were ever known before. Fighters flew among and above the bombers. As the battle progressed they altered formation organization in attempts to prevent the R.A.F. pilots from destroying the bombers, and in turn to endeavour to destroy more British fighters themselves. But the R.A.F. pilots, disregarding their own safety, flew right into the great formations and attacked the bombers, breaking up the serried ranks and disorganizing them so that they turned back in disarray and fled. One Canadian, two Polish, and one Czech squadrons were among the R.A.F. formations that fought the battle, and Dowding paid a special tribute to the dash of the Poles and Czechs. The American Eagle squadron was not effective until the battle was over; but a small number of foreign pilots served in British squadrons.

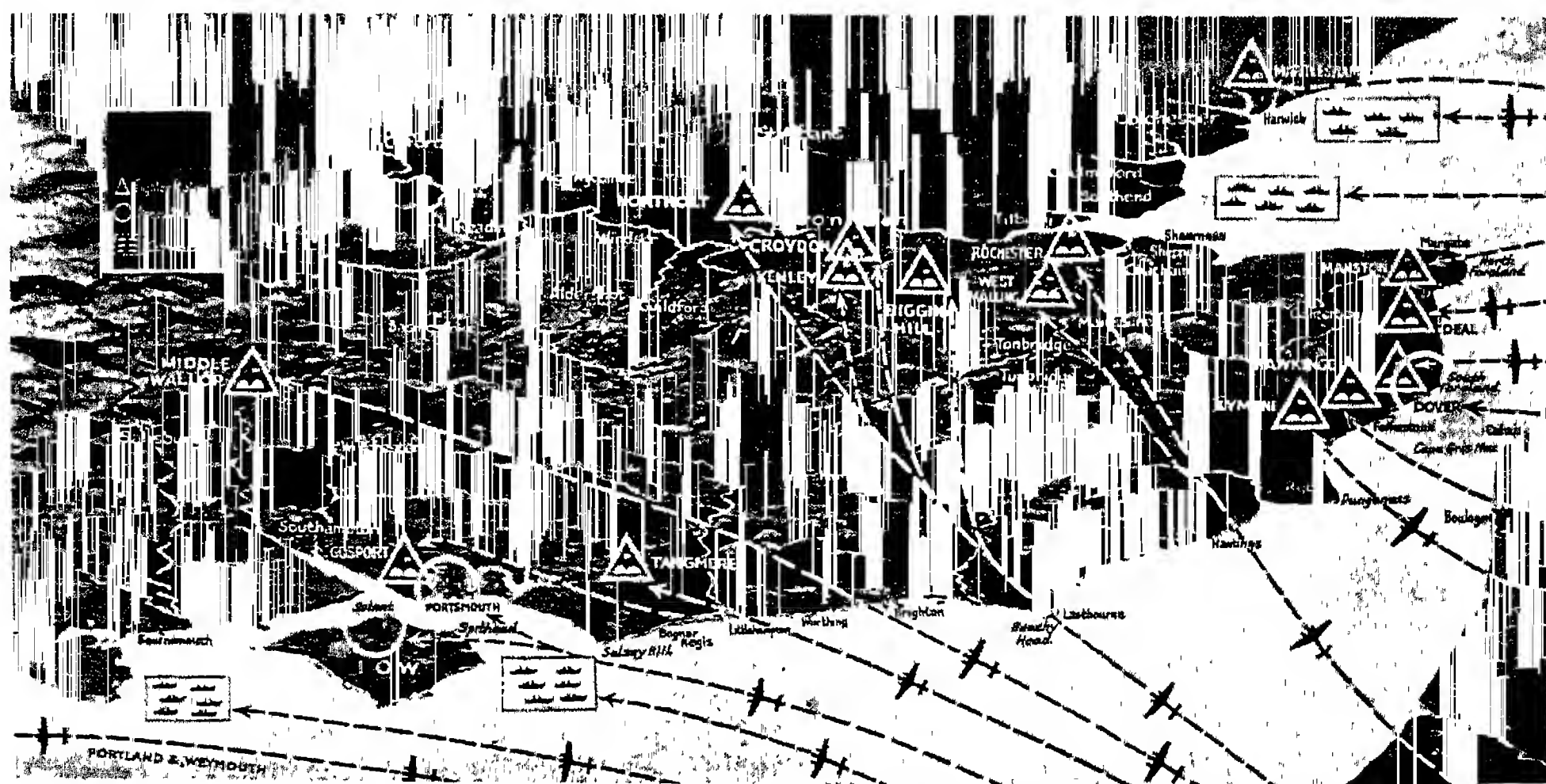
First Planned Assault

The German plan of battle involved a succession of attacks against different targets. The earliest attacks were delivered against shipping in the Channel and Channel ports. Their full weight was first felt on Aug. 8, 1940, when about 280 aircraft attacked shipping in convoy, and southern England; some 45 German aircraft were destroyed that day. This phase of the battle continued until Aug. 11. On Aug. 12 a new phase began, in which the Luftwaffe, by attacks against aerodromes, attempted to eliminate Fighter Command on the ground. Manston, Hawkinge, and Lympne, the three advanced

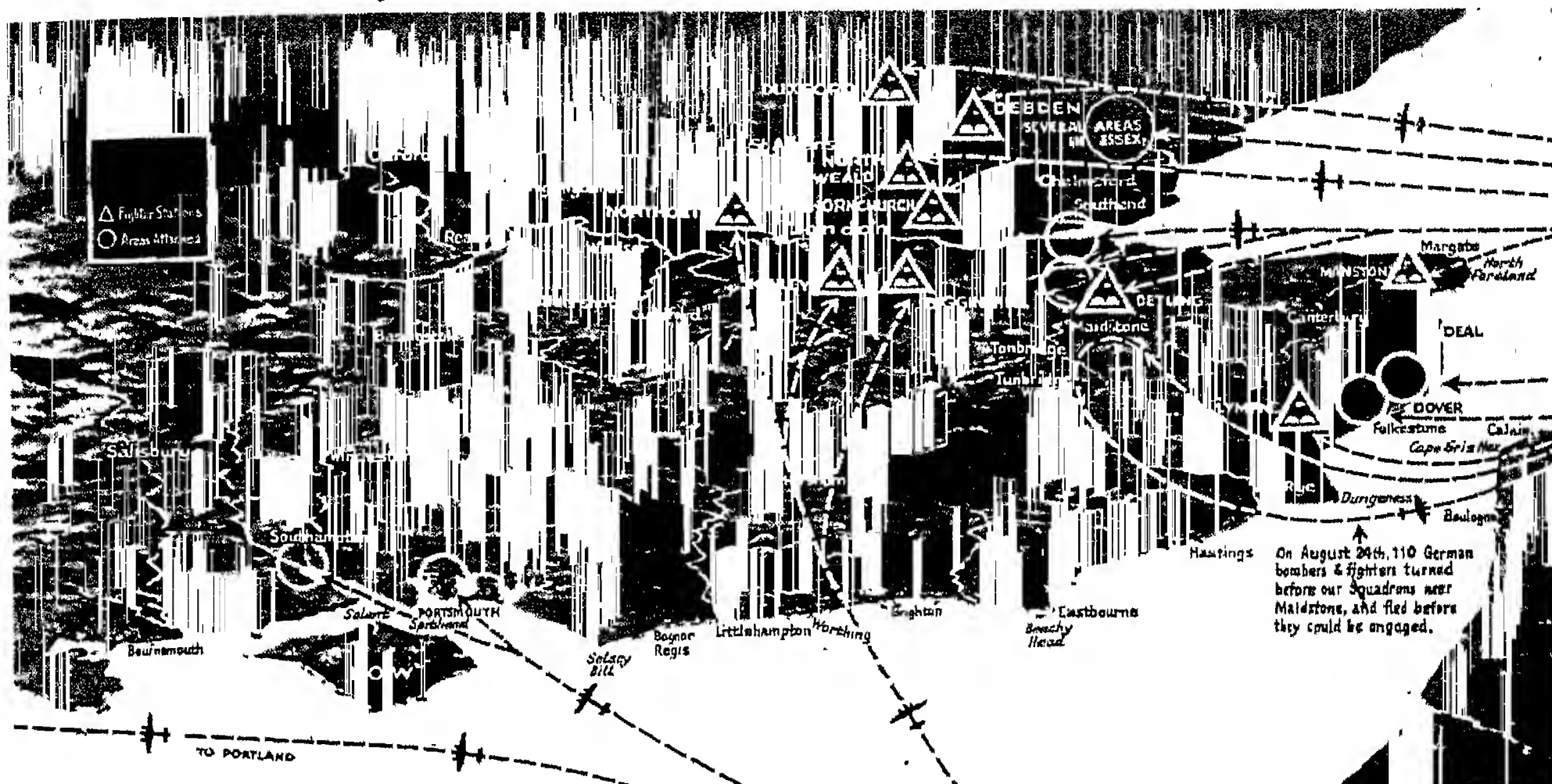
aerodromes, were so heavily bombed and machine-gunned that they were temporarily abandoned. At Kenley and Biggin Hill direct hits were scored on shelter trenches and altogether the damage done to fighter aerodromes was serious, though by dispersing grounded aircraft Dowding kept loss of machines low. The Germans, however, failed to realize how much success they had had, and on Sept. 11 switched their main attacks to London.

This phase was preceded by a daylight attack against the London docks on Sept. 7 by 700 bombers and fighters; 40 were shot down, 13 others were damaged. That was the start of the so-called battle of London. The bombers returned in the dark and continued until dawn; 306 persons were killed and 1,337 seriously injured.

The day and night attacks continued in round-the-clock bombing. For 57 nights (until Nov. 2) the bombing of London continued, although on Oct. 6 only one bomb fell. The capital was not the only target, but it was the main target, in the battle of Britain. The Luftwaffe intended to deliver a knock-out blow. But the Germans had underestimated the weight of bombs required to destroy so scattered a city, and they did not possess the power to succeed. Sept. was the critical month for London; 5,730 persons were killed and nearly 10,000 seriously injured. But just as the Luftwaffe had failed to gain victory through the shipping attacks of



Battle of Britain. Diagram showing the scope of the opening phases of the German offensive from August 8 to 19, 1940. Massed formations of bombers, escorted by fighters, attacked convoys, coastal towns, and fighter aerodromes (shown here as triangles). German losses, from German records, during July 10—Sept. 8 were 973 machines destroyed, 319 damaged. Reproduced from *The Battle of Britain*, by permission of the Controller of H.M. Stationery Office



Battle of Britain : second phase. After a few days' lull the German raiders struck on Aug. 24 with force against the inland fighter bases of the R.A.F., though still for a time maintaining attacks on coastal targets. Some 35 major raids took place up to Sept. 6, in the course of which 578 enemy aircraft were destroyed

Both charts reproduced from The Battle of Britain, by permission of the Controller of H.M. Stationery Office

July or the aerodrome attacks of Aug., they equally failed to gain it through the urban attacks of Sept. Fighter Command continued successfully to oppose them.

Although not more than 21 R.A.F. fighter squadrons were engaged in the air at any particular moment, the pace became too hot for the Luftwaffe, and in Oct. the majority of the German heavy bombers were withdrawn from daylight operations and replaced by fighter bombers.

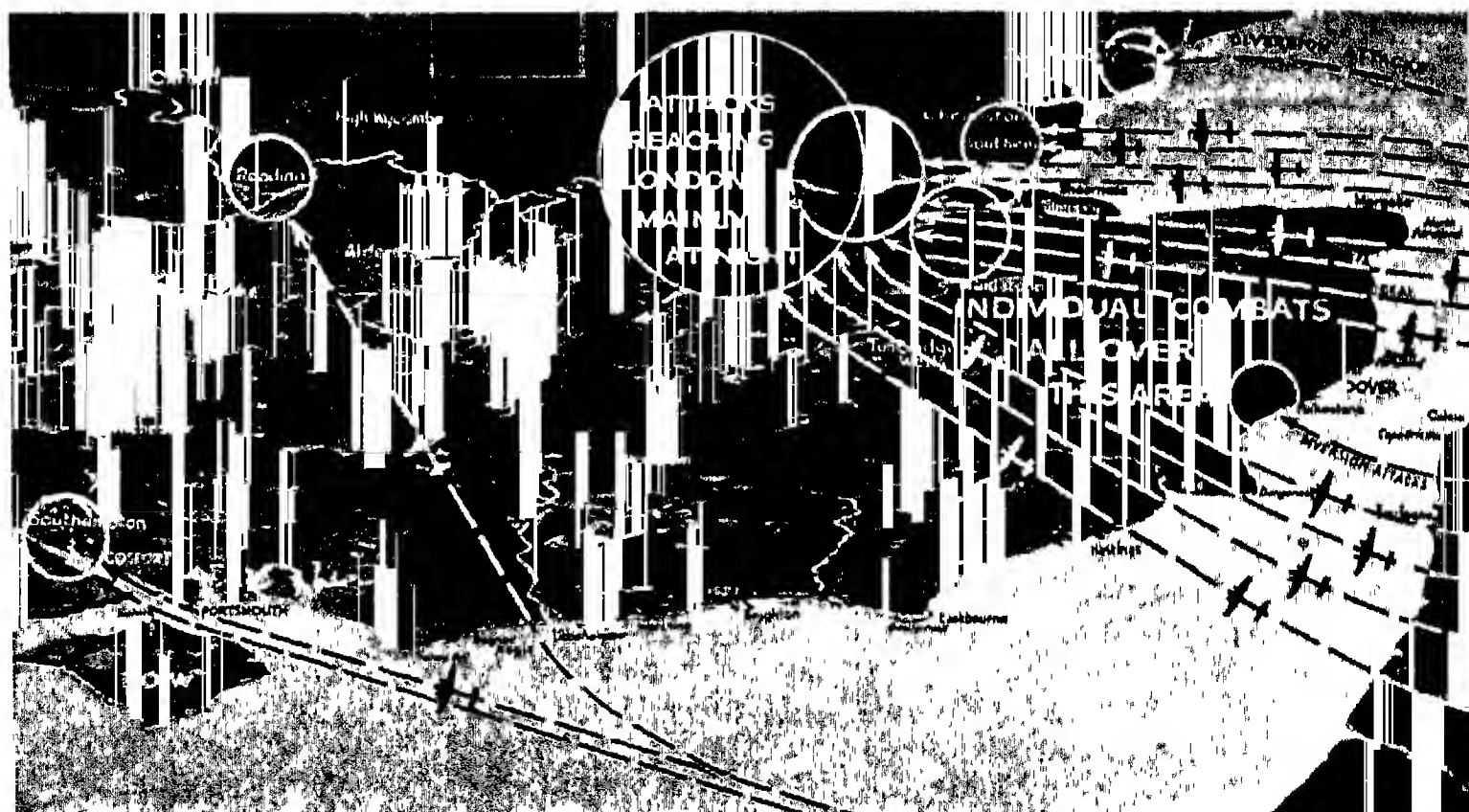
Luftwaffe records examined by the Allies after the German surrender in 1945 indicated that the German losses in the Battle of Britain as originally assessed by the R.A.F. at 2,375 aircraft destroyed were exaggerated. According to the German records, between July 10 and Oct. 31, 1,733 German aircraft were destroyed and 643 damaged. During the period July 10-Sept. 6 German losses were 973 destroyed and 319 damaged; during Sept. 7-Oct. 31, 760 destroyed and 324 damaged. The four highest daily totals shot down by fighters and A.A. guns were: Aug. 15, 76; Aug. 18, 71; Sept. 15, 56; Sept. 27, 55. If the number of aircraft entered in

the German records as damaged is added to the number entered as lost, it will be seen that the British claim of aircraft destroyed is almost exactly the same as this total (2,376).

From Aug. 8 to Sept. 5, R.A.F. fighters flew 19,142 sorties, and from Sept. 8 to Oct. 31, 29,163. During these operations the R.A.F. lost 375 pilots killed and 358 wounded. On July 10, 1947, King George VI unveiled a memorial chapel in Westminster abbey dedicated to the memory of the 1,495 pilots and other R.A.F. personnel killed in the Battle of Britain, and containing a roll of honour on

which their names are inscribed.

Three miscalculations by the German staff were responsible for the Luftwaffe's loss of the Battle of Britain. First, the ability of R.A.F. fighter command to protect Great Britain generally and at the same time concentrate sufficient fighters to meet the main attack had been completely under-estimated, as had Great Britain's A.A. artillery defences, which shot down one-seventh of the total enemy aircraft destroyed in the battle. Secondly, all German aircraft were insufficiently armed and armoured for independent air action. Thirdly, German bombers were designed for day-



Battle of Britain : third phase. A last effort to achieve victory was made by Germany from Sept. 7, on which date the great assaults on London began. Between Sept. 7 and Oct. 31 the enemy lost 760 aircraft. Attacks continued, but in diminishing force

light operations, and when diverted to strategic night attacks crashed in great numbers on their own aerodromes, being unsuited (and the crews insufficiently trained) for night operations.

The German bombers used in the battle were the Junkers 87 and 88, the Heinkel 111K, and the Dornier 17 and 215; fighters were the Messerschmitt 109 and 110. They were opposed by the Spitfire, the Hurricane, and the Defiant.

In favour of the R.A.F. were its more highly trained fighter pilots: better armoured fighter aircraft (with armour behind and in front of the cockpit), mounting eight machine-guns with a fire-power of 9,600 rifle-calibre rounds a minute; and the fact that most British pilots who made parachute descents came down in their own territory.

In the course of Nov., 1940, the day fighting gradually died away; the heavy night attacks against provincial cities began; they continued until the Luftwaffe regrouped for the German invasion of Russia.

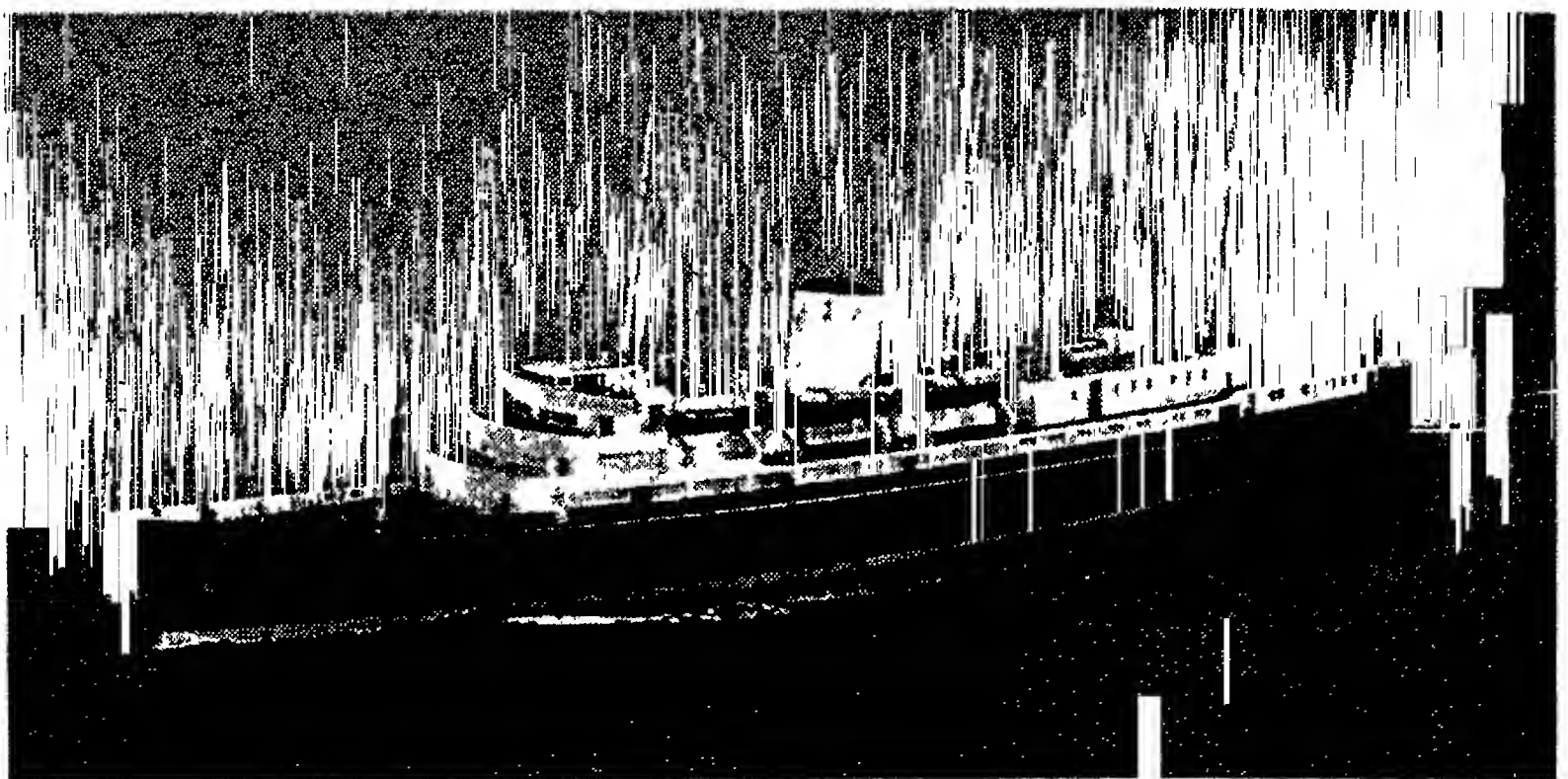
During the official period of the battle German aircraft killed 1,700 and seriously wounded 3,360 persons by day, and killed 12,581 and injured 16,965 by night; most were civilians. *Consult* dispatch by A.C.M. Sir Hugh Dowding published as a supplement to the *London Gazette*, Sept., 1946.

Britannia. Name given by the Romans to ancient Britain. It was used also for a Roman-British goddess personifying the island. In the days of Elizabeth I and James I Britannia was revived as an allegorical personage for whom the arms and equipment of Minerva were borrowed, the spear giving place to Neptune's trident as pride in sea-power invaded poetry. The song *Rule Britannia*, 1740, by James Thomson or David Mallet, was the direct expression of this symbolisation.

The figure of Britannia on British copper coinage, adapted from Roman coins of the time of Antoninus Pius, was introduced in the time of Charles II, the French medallist John Roettiers or Rotier taking as his model Frances Teresa Stewart, afterwards duchess

of Richmond and Lennox. Britannia appears on several medals, and on the badge of the Norfolk regt.

Britannia. British royal yacht named by Elizabeth II and launched at Clydebank April 16, 1953. Of 4,000 tons displacement, the Britannia was so designed that she could easily be converted into a hospital ship. She carried members of the royal family on a number of journeys—e.g. Elizabeth II to the Hebrides and the duke of Edinburgh to Australia for the Olympic Games, both in 1956.



Britannia. The British royal yacht on her trials, 1953. She was launched and named at Clydebank by Queen Elizabeth II

Britannia. First liner operated by the Cunard company between the U.K. and U.S.A. She was 207 ft. long, 34 ft. in beam, and 1,156 tons displacement. Her engines were of the side lever type and, developing 740 h.p., drove paddles to give the vessel a speed of nine knots. She began her first trans-Atlantic crossing July 4, 1840, and took 14 days 8 hours. Charles Dickens sailed to America in her in 1842.

Britannia. Training ship for officers of the British navy. There have been several ships of the name in the British navy, and in 1859 one was made a training ship for naval cadets. This was discarded after a time, but the name was transferred to the Prince of Wales, a vessel which was launched in 1863, and had a normal displacement of 6,200 tons. The Britannia was first stationed at Portsmouth, but soon was moved to Dartmouth. There, up to 1903, thousands of cadets, including George V, were trained and the whole establishment was known as the Britannia.

Britannia Metal. An alloy containing about 90 p.c. tin, 5-10 p.c. antimony, and sometimes small amounts of copper and zinc. Silvery white with a slightly bluish

tinge, it is hard, resistant to corrosion and tarnishing, and takes a high polish.

Britannia Royal Naval College. Institution at Dartmouth, Devon, for the training of R.N. officers. Until the royal yacht Britannia was launched in 1953, the title of the college was the Royal Naval College, Dartmouth, and its ship's name as a naval establishment was H.M.S. Britannia, this name having been derived from the old wooden line-of-battle ship which the college

replaced. As the name Britannia was required for the royal yacht, the college became H.M.S. Dartmouth, and the word Britannia was included in the title.

The college, opened in 1905, stands on Mt. Boone to the N. of Dartmouth. It is under a captain and a commander, with a headmaster in charge of the purely educational work.

Until 1948, naval cadets had for 35 years entered the navy at the age of 13½, leaving the college at 17 to join the fleet and being promoted to midshipmen a few months later. Osborne College, I.o.W., where the cadets formerly spent the first year of naval training, was closed in 1923 after 20 years' service, cadets being admitted straight to Dartmouth.

From 1954 cadets joined at 18 and spent their time as midshipmen at the college, going to sea as acting sub-lieutenants at 20, having completed all the professional courses which were previously undertaken some two years after leaving the college.

Britannicus, CLAUDIUS TIBERIUS (A.D. 41-55). He was son of the Roman Emperor Claudius by Messalina, but was passed over for the succession in favour of Nero, son

of Agrippina, 2nd wife of Claudius, by her first husband when Claudius died in 54; Nero had his stepbrother poisoned in 55.

British Academy. Learned society, incorporated Aug. 8, 1902, for the promotion of historical, philosophical, and philological studies. It had been founded in 1901, and received its charter to mark the coronation of Edward VII. Its work is divided into ten sections: ancient history; medieval and modern history; biblical and ecclesiastical studies; Oriental studies; literature and philology (classical); literature and philology (medieval and modern); philosophy; jurisprudence; social and economic sciences; archaeology and history of art. Its headquarters is at Burlington Gardens, London, W.1.

British Artists, ROYAL SOCIETY OF. Founded 1823 for the exhibition and sale of the works of living artists. It was incorporated by royal charter in 1847 and received the title of royal on the occasion of Queen Victoria's jubilee, 1887. Membership is restricted to 200. Its headquarters is in Suffolk Street, London, S.W.1.

British Association. Society for the advancement of science, founded by Sir David Brewster and others in 1831. It holds an annual conference addressed by some eminent scientist chosen president for the year, after which papers are read and discussions held sectionally on various branches of science. The association also promotes a better understanding of the significance of scientific research and its impact, through its applications, upon society. The association has research committees, collaborates with other scientific organizations, and issues publications. Admission to the various forms of membership is open to all interested in science. The offices are at Burlington House, London, W.1.

British Broadcasting Corporation. Public body for the administration of broadcasting services in the U.K. Established by royal charter, Jan. 1, 1927, it superseded the British Broadcasting Co., retaining the company's transmitters, studios, staff, sources of revenue, and public goodwill. Its existence was renewed by further charters Jan. 1, 1937 (10 years); Jan. 1, 1947 (5 years); and July 1, 1952 (10 years). It is controlled by a board of governors who are appointed by the crown. The board appoints a director-general

in whom executive responsibility is vested. The B.B.C. derives its revenue from broadcast receiving licences and gets a grant-in-aid for external services.

In the day-to-day choice of programmes, the B.B.C. is free from government control; but there are certain provisos, the most important being that the news should be presented as objectively as possible, that the corporation should not broadcast its own opinions on public affairs, and that there should be no political bias over the whole range of its programmes. Certain advisory councils are appointed by the B.B.C. to guide policy in religious broadcasting, charitable appeals, etc.

The B.B.C., which maintains its own symphony orchestra, several smaller orchestras, and its own repertory company of actors, broadcasts three sound services—home, light, and third; the home service is supplemented by six regional services. The television service transmits one national programme with contributions from the regions and occasionally from Europe. The B.B.C. also maintains a general overseas service in English (inaugurated 1932) directed to all parts of the British Commonwealth; transmissions in English to particular audiences in the Commonwealth and other countries; and foreign language broadcasts in more than 40 languages.

The first foreign language service was in Arabic, and began in Jan., 1938; broadcasts in Spanish and Portuguese to Latin America followed in March, 1938. Many other services developed during the Second Great War when the B.B.C. acquired a world-wide reputation for its impartiality and accuracy, and in occupied Europe for its sympathy and encouragement. There are regular transmissions in Welsh on the Welsh home service, in Gaelic on the Scottish home service. Some 60 transmitters are used to broadcast sound programmes; some 15 to broadcast vision plus sound.

The B.B.C. publishes weekly the *Radio Times*, giving programmes, and the *Listener*, containing the text of selected talks, etc.; an annual handbook; and numerous booklets. Its h.q. is Broadcasting House, Langham Place, London, W.1; it has regional offices in various big towns of the U.K., and overseas offices in Paris, New York, Mexico City, Buenos Aires, and other cities,

as well as in the countries of the Commonwealth.

British Caribbean Federation. See Caribbean Federation.

British Columbia. The most westerly province of Canada. It is bounded on the E., from 49° N. to 54° N., by the Rocky Mts., and thence by the 120° W. meridian; on the W. by the Pacific Ocean and the S. extension of Alaska; on the N. by the 60th parallel, and on the S. by the U.S.A. along the 49th. It includes many islands of the North Pacific, notably the Queen Charlotte group and Vancouver I. Area 366,255 sq. m., including 6,976 sq. m. of water.

The predominant physical feature of the province is the parallel ranges of the Rockies, the Columbia mountain system, and the Coast range, which cover all British Columbia except the N.E. corner, and are interspersed with deep-lying valleys, rolling uplands, and dense forests where the trees attain immense growth. Highest peaks are Mt. Robson, 12,972 ft., in the Rockies; Mt. Waddington, 13,260 ft., in the Coast range; and Mt. Fairweather, 15,300 ft., on the border of Alaska.

Excepting the Peace, tributary to the Slave, and the Liard, tributary to the Mackenzie, which drain into the Arctic, most of the rivers flow S. to the Pacific. The two most important, the Fraser and the Columbia, rise in the Rocky Mts.; the Fraser has its whole course within the prov., but only the upper portion of the Columbia is Canadian. The coast-line is remarkable for its numerous inlets and its extreme sinuosity, giving it a total length of something like 7,000 m.

Owing to the great range of lat. over which the prov. extends, climate varies much according to local conditions. S.W., in the lower coastal belt, it is similar to the S. of England. The flora, too, varies considerably. Because of the long growing season, high average temperature, and abundant precipitation, vegetation in valleys and lowlands is almost subtropical in appearance. Of the fauna, sheep, goat, grizzly bear, moose, and woodland caribou are among the chief mammals; duck, grouse, partridge, quail, snipe, and ptarmigan are among the game birds; trout are plentiful in all the lakes and streams, and salmon in some of the rivers.

Development began in 1885 when the completion of the trans-continental system of the C.P.R. linked British Columbia with the

rest of Canada, and gave outlet to its great natural wealth. The chief basic resources are timber, minerals, fisheries, and agricultural products. The forests contain the largest reserves of softwoods in the British Commonwealth. The principal timbers are Douglas fir, cedar, spruce, and hemlock. Coal is abundant: the other chief mineral deposits are gold, silver, copper, lead, zinc, and some of the rare earths and metals. Some 98 p.c. of Canada's lead production and almost 10 p.c. of the world's total comes from the giant smelter at Trail and the Sullivan mine.

The fisheries—salmon, halibut, herring, and cod—yield nearly one-half the total of all Canada: there was a record salmon run in 1954, when some 10,000,000 fish were landed. Fruit growing, chiefly in the Okanagan valley, is important.

Water-power resources are considerable, with a potential of some 10,000,000 h.p., of which more than 1½ million hydro-electric h.p. had been developed by 1955. One enterprise towards which the British government advanced \$120,000,000 was the diversion westward of the Nechako river to a tunnel 10 m. long bored through the Rocky Mts. to produce a fall of 2,580 ft. The main

object of this undertaking, completed in 1954, was to supply hydro-electric power to a smelter plant for aluminium at Kitimat, lying at the head of Douglas Channel, 70 m. S.E. of Prince Rupert. A pipe-line carrying petroleum to Vancouver from Alberta was inaugurated in 1953; and a contract for another carrying natural gas was made in 1955.

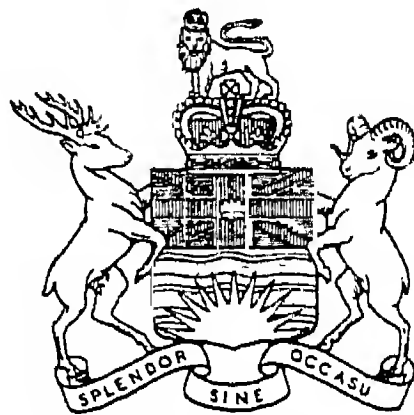
British Columbia is the third manufacturing prov. of Canada, and during and after the Second Great War developed secondary industries, notably the production of pulp, paper, and plywood. Vancouver city, on the mainland, is the commercial metropolis of the province, and the world's largest winter shipping grain port.

In addition to the transcontinental systems of the C.P.R. and the C.N.R., the prov. is served by its own Pacific Great Eastern rly. and the B.C. Electric rly., by lake and river transport, by 22,500 m. of excellent highway, and by internal and external air services.

There are more than 1,200 schools, ranging from elementary to high school standard; three schools for the training of student-

teachers; and the University of British Columbia (*v.i.*).

British Columbia is represented in the federal senate by six members, in the federal house of commons by 18. The provincial govt. is administered by a lieutenant-governor and a legislative assembly of 48 members. Victoria, on Vancouver I., is the capital; other cities are Vancouver, New Westminster, Prince George, Prince Rupert, Kamloops, Nelson, Vernon, Kelowna, and Trail. Pop. (1951) 1,165,210.



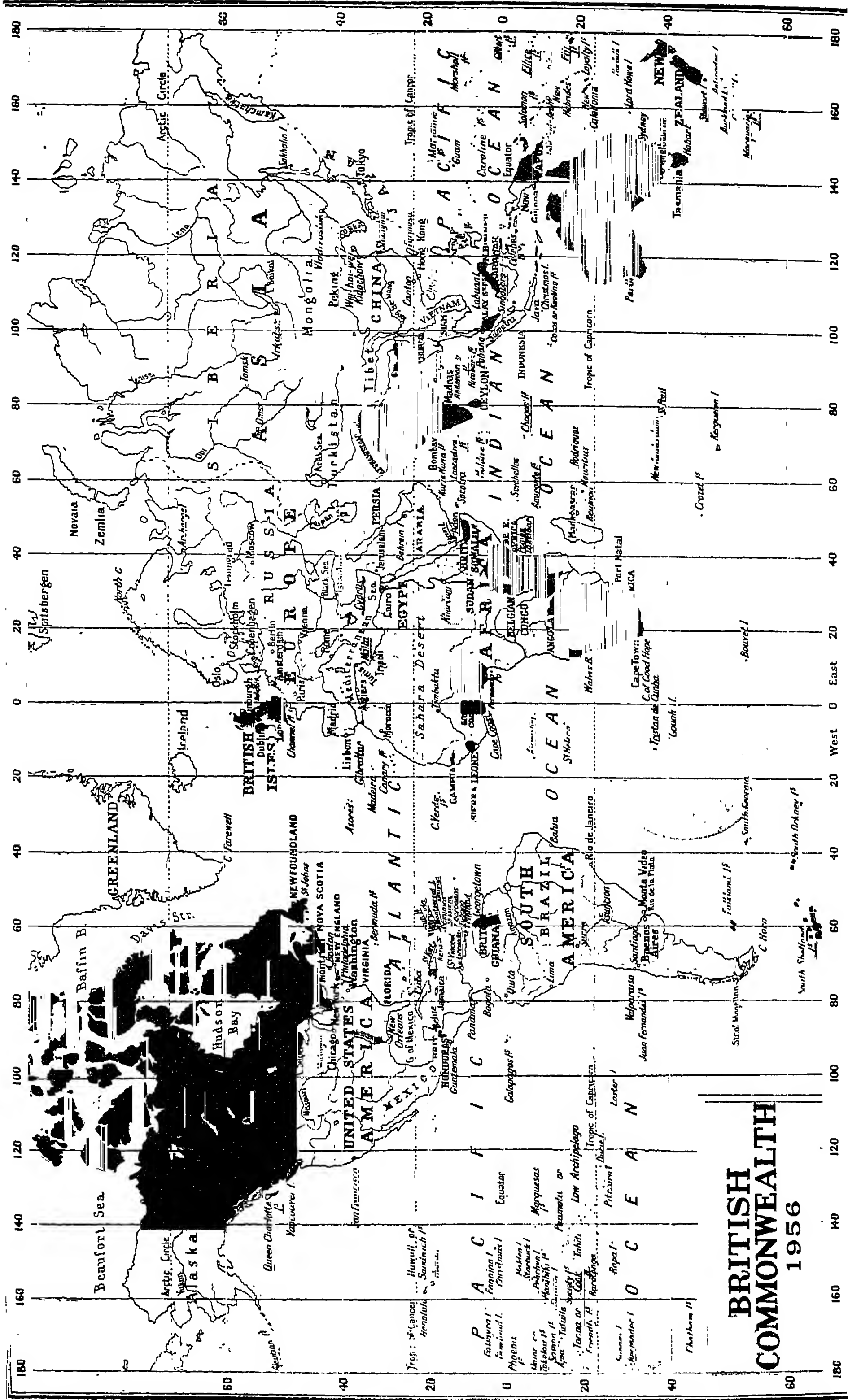
British Columbia arms

HISTORY. Leading dates in British Columbia's history are the arrival of Capt. Cook at Nootka Sound in 1778; the signing of the Nootka Sound convention between Spain and Great Britain in 1790, whereby Spain relinquished her claims; exploration of the North Pacific coast by Capt. George Vancouver, 1792-94; the overland journey across Canada to the Pacific of Alexander Mackenzie, 1793; the treaty of 1824 between Russia, Great Britain, and the U.S.A., which pushed back the southern limit of Alaska (then owned by Russia) to 54° 40' N.; the Oregon Treaty of 1846, which fixed the boundary between the U.S.A. and British territory on the 49th parallel. Until 1858, when the area became the crown colony of British Columbia, the mainland was under the administration of the Hudson's Bay Co. The same company also leased Vancouver I. during 1843-49 when it, too, became a crown colony. The two colonies were united in 1866, and entered the Canadian confederation as a province in 1871.

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British Columbia, UNIVERSITY OF. Institution of higher learning founded at Point Grey, 6 m. W. of Vancouver, by an act of 1908, and opened as a teaching institution in 1915. The buildings, on a site of 548 acres 300 ft. above the sea, were opened in 1925. It offers degree courses in arts, medicine, forestry and various aspects of agriculture, science pure and applied, etc. and also organizes university extension courses. It caters for 5,000-6,000 students.





BRITISH COMMONWEALTH: THE AREAS COLOURED (OR UNDERLINED IN) RED INCLUDE THE NATIONS OF THE COMMONWEALTH, COLONIES AND PROTECTORATES, AND TERRITORIES ADMINISTERED UNDER UNITED NATIONS TRUSTEESHIP

BRITISH COMMONWEALTH AND EMPIRE

P. N. S. Mansergh, Smuts Professor of the History of the British Commonwealth, Cambridge

Here is outlined the history of the British Commonwealth and Empire as a whole. It is supplemented by fuller articles on the United Kingdom and the other countries and creators of the Commonwealth

In 1955 the British Commonwealth and Empire covered 14,435,000 sq. m.—about two-sevenths of the world's land area—and was computed to have a pop. of more than 610,000,000. Approximate populations of the constituent countries were: United Kingdom, 50,000,000; Canada, 15,200,000; Australia, 9,000,000; New Zealand, 2,088,000; Union of South Africa, 13,000,000; India, 369,000,000; Pakistan, 76,000,000; Ceylon, 8,000,000; colonial empire, 87,000,000.

A Unique Phenomenon

In the history of political institutions the British Commonwealth presents a unique phenomenon. It resembles as little the colonial systems of the ancient world, of Greece, Carthage, or Rome, as those which, from the 16th century, Portugal, Spain, the Dutch Republic, and France successively established. The British Commonwealth contains every variety of type of related communities: self-governing nations, some as democratic in their constitutions as Great Britain itself, and all as free to shape their own destinies; crown colonies, governed more or less directly from Whitehall; dependencies, great and small; protectorates; and points of advantage utilised as fuelling or naval and air stations. With the self-governing countries the relation of the U.K. is that of an equal; while the rest are in a greater or lesser degree subordinate to the U.K.

The history of the British empire falls into two periods sharply divided by the treaty of Versailles, 1783. In the course of the 17th and 18th centuries England built up a great overseas empire of which the most important part was lost by that treaty. After 1783 the U.K. built up a second empire.

The colonial period in the history of modern Europe dates from the great geographical discoveries which distinguished the later years of the 15th century. The Portuguese were the first to embark upon systematic maritime enterprise; the Spaniards, under the leadership of Italian immigrants, followed suit. Italian mariners domiciled in England would have given England its full share of these initial enterprises had it

been as ready as Portugal or Spain to seize the opportunity. The voyages of the Cabots, starting from Bristol, were hardly second in geographical importance to those of Vasco da Gama and Christopher Columbus. But they were not followed up. England, in the later 15th century, was not ready for maritime adventure, and certainly not for colonisation.

The accession of the first Tudor in 1485 marked the end of the faction fights called the Wars of the Roses. Those wars had represented the expiring struggle of feudalism to assert its authority against the crown, and when they ended the country was in a low state both economically and politically. The Tudors were to re-create a social order and to revitalise the national life; and one of the first manifestations of the revival of the nation was its energetic participation in maritime enterprise. Henry VIII created the English navy and made provision for systematic instruction in the art of navigation. The Reformation in England and the consequent contest with Spain supplied the motive for the sea adventures, half-crusading, half-buccaneering, which distinguished the England of Elizabeth I: Spain symbolised the spirit of religious intolerance and commercial exclusiveness. To break down the Spanish monopoly in the New World; to avenge the cruelties inflicted upon English sailors by the Inquisition: these were the motives which inspired the initial enterprises of the Elizabethan sea-dogs—Hawkins, Frobisher, Gilbert, Raleigh, Drake—whose voyages were recorded by Hakluyt. Nevertheless, when Elizabeth I died there was no permanent settlement of Englishmen overseas.

First Overseas Settlements

In 1606 a charter was granted by James I to the Virginia Company, and in 1607 an English colony, destined to be permanent, was planted in Virginia. The motive force behind this settlement was purely economic. In 1620 the Mayflower made her famous voyage across the Atlantic carrying to the New World 102 Brownists who, having sought in the Dutch Republic a refuge from England, left that country to seek in the wilderness a place wherein they

could worship God after their own fashion. These Pilgrim Fathers founded the colony of New Plymouth. In 1629 the great Puritan exodus resulted in the establishment of Massachusetts. Maryland was founded in 1634 by Lord Baltimore as a refuge for Roman Catholics; other colonies were established in Rhode Island, 1636, and Connecticut, 1635, chiefly as the result of migrations from Massachusetts.

An English settlement had been planted in the Bermuda Islands, 1611, already annexed to the crown by Sir George Somers in 1609; in the West Indies, St. Kitts was settled in 1623, Barbados 1625, Nevis 1628, the Bahamas 1629, Antigua and Montserrat 1632, and Anguilla 1650. Still more important was the acquisition of Jamaica, conquered from the Spaniards in 1655: this was the first British possession in the New World acquired as the fruit of war against another European country.

The Carolinas were founded in 1663; New Jersey became British in 1664; and in 1674 New Netherland, captured from the Dutch in 1664, was confirmed in British hands and re-named New York in honour of the duke of York, afterwards James II. William Penn laid the foundations of Pennsylvania in 1682.

The accession of William III and Mary II in 1688 marked the beginning of that world-wide contest between Great Britain and France which, carried on under a series of names (War of the Spanish Succession, War of the Austrian Succession, etc.) did not end until 1815. One important point at issue throughout this period was whether Great Britain or France should dominate North America and control the destinies of India; it was settled for the foreseeable future by Nelson and Wellington.

Gibraltar British

The treaty of Utrecht, 1713, gave Gibraltar and Minorca—and command of the Mediterranean—to Great Britain; France ceded Acadia (Nova Scotia) and recognized Newfoundland and Hudson Bay as British. The Asiento agreement, 1713, with Spain opened to the British the nefarious but lucrative slave trade between Africa and South America; it led

also to perpetual disputes with Spain in the Southern Seas, and in 1739 the quarrel issued in the War of Jenkins's Ear. Merging into the War of the Austrian Succession, it was fought out, as between Great Britain and France, in India and North America, and was closed by the treaty of Aix-la-Chapelle in 1748.

Fighting was renewed in 1756. During the interval the French settlers in North America tried to cut off the British settlements on the Atlantic coast from access to the West. Firmly planted on the St. Lawrence and the lower Mississippi, with their Spanish allies in Florida, the French began building a series of fortified posts linking their settlements in New France (Canada) with those in Louisiana. Owing to the Seven Years' War, 1756-63, this plan came to nothing for, after a disastrous start, Great Britain won a series of victories, culminating in Wolfe's capture of Quebec, 1759. The treaty of Paris registered the transference to the British crown of New France, Cape Breton Island, Prince Edward Island, and Florida.

The expulsion of France from Canada was not an unmixed advantage to the British empire in North America. Had the French remained in Canada and the Spanish in Florida, the British colonies might have manifested their resentment against the commercial and fiscal policy of the government in London, but they could not have afforded the luxury of rebellion, still less of independence.

Rebellion in America

As to the causes which led to the dissatisfaction of the American colonies, while the Stamp Act of 1765 was the occasion and excuse, the essential cause was the attempted enforcement of control of the colonies from London. Grenville had good reasons for his attempt to meet the expenses of the colonial establishments out of colonial revenues; but his method was less defensible than his aim, and was hotly resented by a considerable section of the colonists who raised the cry of "no taxation without representation." This domestic quarrel developed into civil war, and the civil war expanded into a European, indeed a world-wide, contest.

With the active assistance of France, Spain, and the Dutch Republic, the 13 colonies wrested their independence from a mother

country hard pressed in India and the Mediterranean as well as in America. By the treaty of Versailles, Sept. 3, 1783, Great Britain acknowledged the independence of the 13 colonies; Florida and Minorca were restored to Spain; Tobago, St. Lucia, Goree, Senegal, and certain leading factories in India to France. The first British colonial empire was virtually shattered.

Newfoundland was the one remaining colony settled by Britons. Canada was as yet a colony of Frenchmen living under the British flag, with a few British fishermen and traders in Nova Scotia, Prince Edward Island, and the Hudson Bay territories. The British settlements in the Bermudas and the West Indies; Gibraltar; settlements established on the Gambia and the Gold Coast by a company chartered in 1618; and St. Helena also remained.

The East India Company

In 1600 a company of merchants obtained from Elizabeth I a charter authorising them to trade with the countries of the Far East. They set up their first factory, as these far eastern trading settlements were called, at Surat in 1609. Other settlements followed (*see* Indian Sub-Continent: History). For a century before English merchants set foot in India, the Portuguese had been carrying on a lucrative trade with that country and in the Spice Islands, the name then given to the East Indian archipelago. The Dutch ousted them from the East Indies, and succeeded in preventing the English merchants from establishing themselves in the islands.

In 1689 the East India company made a deliberate bid for territorial position, in order to "make us a nation in India," and transformed its factors into governors. The Portuguese empire in India was decadent; the Dutch had established a factory near Calcutta, but were more interested in their trade with the islands. Within India, the great Muslim empire of the Moguls was in process of disintegration, and the strongest forces were those of the nizam of Hyderabad, the sultan of Mysore, and the Hindu confederacy of the Mahrattas. But the English company, before it could establish territorial rule, had to vanquish another great European rival.

During 1604-66 the French had established five factories in India; and in 1674 they secured a firm

footing at Pondicherry. In the middle years of the 18th century Great Britain and France were plunged into a struggle in India as well as in North America. Thanks to Clive and Coote, the English company emerged triumphant in 1763. The destruction of the French military establishments in India left the field open for a contest, little desired but inevitable, between the English company and the Indian rulers. Clive's victory at Plassey had already established British supremacy in Bengal.

During 1772-85 Warren Hastings, in the face of obstruction and obloquy, laid the foundations of British India. He purified the administration in Bengal; defined the relations of the company with the Great Mogul; and established some supremacy over the governments of Madras and Bombay. Against the Mahrattas, the company had to fight three wars: the first, 1778-82, under Hastings; the second, 1803, under the brothers Wellesley; the third, 1817-19, under the marquess of Hastings: the third broke the power of the Mahrattas. Even more menacing was the hostility of Haider Ali of Mysore, who carved out for himself an imposing principality on the dissolution of the Mogul empire. In close concert with the French, Haider Ali and his son Tippoo maintained an obstinate contest with the English company, and not until 1799 was it decided in the company's favour.

Successive English governors by a series of annexations made the company the lord paramount of the Indian sub-continent, and direct ruler of a large part of the country. An extensive slice of Mahratta territory was annexed in 1818; Assam, Arakan, and Tenasserim in 1826; Sind in 1843; the Punjab and Satara in 1849; Lower Burma in 1852, Jhansi and Nagpur in 1853, Oudh in 1856. Among the causes of the Mutiny of 1857 was the rapidity of this territorial expansion.

Result of the Mutiny

The mutiny brought the rule of "John Company" to an end, and British India was transferred to the crown. Parliamentary interference in Indian affairs had begun with Lord North's Regulating Act of 1773; Pitt's India Act of 1784 subordinated the political operations of the company to a ministerial board of control; in 1858 the authority of the company was

extinguished, and India became an apanage of the crown; on Jan. 1, 1877, Queen Victoria was proclaimed empress of India at Delhi. But within India nationalist sentiment was stirring, and the Indian National Congress held its first session in Bombay in 1885. Predominantly Hindu in membership, the Congress, constitutional in its methods, pressed for an ever-increasing share for Indians in the government of India. Concessions were made, notably in 1892 and in the Morley-Minto reforms of 1909; but they fell far short of the Congress demands for Indian self-government. In 1917 the secretary of state for India, Edwin Montagu, declared responsible self-government to be the goal of British rule in India. This, despite delays and much bitterness within India and without before the fulfilment of the aim, was of decisive importance in the history of British rule in India.

Development: in Canada

When the independence of the North American colonies was recognized in 1783 Canada had about 70,000 Europeans, nearly all French in blood, speech, and tradition, and Roman Catholic in creed. But Canada was under British rule, and after 1783 a large body of American loyalists migrated there; Great Britain made generous grants to them of both land and money. Under one flag, one governor, one council, one code of laws, and one constitutional system, there were now living side by side two peoples differing in origin and, for the most part, in creed.

Pitt's recognition of the difficulties led to the passing of the Constitutional (or Canada) Act of 1791. This act divided Canada into two colonies: Lower Canada, the original French province of Quebec, and Upper Canada, the more recent English province of Ontario. In each colony land was set apart for the endowment of the dominant Church: each was to have its own governor, assisted by a nominated executive council and a legislature of two houses—a council of nominees and an elected house of representatives.

For a time both Canadas were well content, and showed this by loyal support of Great Britain in the American War of 1812. But the act of 1791 gave the local legislatures no control over the executive. This defect led to prolonged conflict between legislatures and executive and eventually, in 1837,

to armed rebellion in Lower Canada. The rebellions were suppressed; but in 1838 the home government decided to suspend the constitution and sent out Lord Durham as high commissioner.

The Durham Report

Durham's mission led to the publication in 1839 of a report which remains the most important document in the constitutional history of the British overseas empire. It recommended the union of the two Canadas, an increase in the number of the legislative council, a reform of municipal government, a civil list, and, above all, that the colonial executive should be made responsible to the colonial legislature. "The governor," Durham insisted, "should be instructed that he *must carry on his government by heads of departments in whom the United Legislature shall repose confidence.*" The italicised words constitute the charter of colonial self-government in the British empire.

In 1840 the imperial parliament passed the Union Act, which provided for the union of Upper and Lower Canada, a bi-cameral legislature (a nominated council and an elected house of representatives), and a civil list. There was, curiously enough, no mention of the responsibility of the executive; but the British cabinet system was implicit in the new Canadian constitution, and in 1847 explicit instructions were sent to the governor, Lord Elgin, "to act generally on the advice of the executive council and to receive as members of that body those persons who might be pointed out to be so by their possessing the confidence of the assembly." Thus for the first time in a British colony was established the principle of responsible government.

Australasian Colonisation

The foundation of British colonies in the Pacific may be ascribed indirectly to the loss of the 13 American colonies. After the declaration of independence the Carolinas refused to receive English convicts any longer; Australia, re-discovered by Captain Cook in 1770, appeared to offer an alternative, and in 1788 the first shipload of English convicts landed on the site of the city of Sydney; such was the inauspicious beginning of the colony of New South Wales. Convicts were sent to Tasmania in 1803. For 30 years the convicts had the Australian continent to themselves; but in 1819 New

South Wales was thrown open to free immigrants, and so rapid was the growth of the free population that in 1853 an act of the British parliament put an end to the transportation of convicts.

Meanwhile the parent colony of New South Wales was throwing out offshoots of its own. Western Australia had its origin in a military post established at King George's Sound in 1826, and in the Swan River settlement of 1829; South Australia was constituted a separate colony in 1836, Victoria in 1851, Queensland in 1859. New Zealand was proclaimed British in 1840. In 1842 a legislative council, partly nominated, partly elected, was established in New South Wales, and in 1850 an act was passed by the imperial parliament conferring upon the Australasian colonies general powers which enabled them virtually to settle their own form of government. Under this act New Zealand, New South Wales, Victoria, Tasmania, South Australia, and Queensland adopted responsible constitutions during 1853-59; Western Australia followed suit in 1890.

South Africa

The Cape of Good Hope in South Africa, occupied on behalf of the king of England by a couple of prescient English captains in 1620, was declined by the East India company. Eagerly seized by the Dutch in 1650, it continued to be an appendage of the Dutch East India company, and to be used by their ships as a port of call and by their sailors as a vegetable garden until 1795. In that year, at the request of the Dutch stadtholder, then a refugee in England, it was occupied by a British force lest it should share the fate of the Dutch Republic and pass under the control of the French. Handed back to the "Batavian Republic" by the treaty of Amiens, 1802, it was reconquered in 1806, and, under the treaty of Paris, 1814, was purchased by its conquerors from the new kingdom of the Netherlands. It may thus be regarded as one of the fruits of the Napoleonic wars. (As a result of the same wars Great Britain also retained Mauritius and Ceylon; Malta and Heligoland; Trinidad, St. Lucia, Demerara, and Essequibo.)

At this time the white population of Cape Colony was predominantly Dutch; there was also a considerable body of Hottentots and some 30,000 slaves. In 1819 parliament voted £50,000 to assist systematic emigration to South

Africa, and a carefully selected body of 5,000 people, mainly Scots, were sent out and established themselves at Algoa Bay. From the first there was conflict between the more liberal Britons and the Dutch farmers with their rigid social outlook deriving from their Calvinist faith and their frontier experience.

The Great Boer Trek

The abolition of slavery in the British empire by an act of 1833 aroused the bitterest hostility among the Dutch population, and some 10,000 of them determined to escape from a government that deprived them of their servants and failed to protect them from raiding Kaffirs, and to seek a fresh home in the hinterland of South Africa. During 1836-40 they trekked steadily north-eastward and established, in virtual independence, the two Boer communities of the Transvaal and the Orange Free State.

A handful of British colonists had established themselves at Port Natal in 1824; for some years the Boers to the north seriously threatened their existence, and in the early 1840s it seemed not unlikely that a third Boer state, between the Drakensberg and the sea, would be established. But the British government, careless as to the fate of the hinterland, was jealous of Boer possession of the coast; there was a brief struggle before, in 1843, Natal was formally proclaimed a British colony, and the Boers settled there submitted. In 1856 Natal was separated from Cape Colony, and in 1893 attained responsible government.

Long before that date, serious trouble had broken out in South Africa. In 1848 Sir Harry Smith, governor of Cape Colony, proclaimed the whole territory between the Orange and Vaal rivers as far east as the Drakensberg to be under the sovereignty of the queen. The Boers protested, and the British government, embarrassed by a Kaffir rising, gave way, and in 1852 concluded the Sand River convention. The Boer farmers beyond the Vaal river were accorded the right to "govern themselves without any interference on the part of the queen's government." Thus the Transvaal Republic became an independent state, subject only to the condition that no slavery was to be permitted.

Two years later, a convention concluded in identical terms at

Bloemfontein registered the independence of the Orange Free State. But the position was not satisfactory, and Sir George Grey made an earnest attempt towards the close of the 1850s to bring about a federation of South Africa. He enlisted the support of the Orange Free State; but the home government, anxious only to circumscribe its colonial responsibilities, rejected the project.

In 1869, on the petition of the Chief, British sovereignty was proclaimed over Griqualand West, a native territory to the west of the Orange Free State and rich in diamonds, and in 1871 it was annexed to the crown. The acquisition of Griqualand West was the beginning of a new era of British expansion in South Africa.

Cape Colony was given responsible government in 1872, and during 1874-76 Lord Carnarvon, then colonial secretary, made persistent attempts to carry into effect Sir George Grey's rejected scheme for a South African federation. But the opportunity had been missed. In 1877 Sir Theophilus Shepstone (1817-93) annexed the Transvaal to the crown. That step, hastily effected without regard for constitutional power, may have saved the Boers of the Transvaal from invasion by the Zulus and other tribes which they were ill-equipped to repel; but this did not reconcile them as a people to annexation. In 1879, after a fierce struggle, Great Britain broke the power of the Zulus, and the Boers intensified their agitation for independence. It was conceded in 1881 after a war disastrous to British prestige.

Elsewhere in South Africa British sovereignty was extended over Bechuanaland, 1885; Zululand, 1887. Administration of Mashonaland and Matabeleland was granted to the British South Africa company in 1889.

European Rivalry in Africa

Meanwhile, the African continent had become the subject of a European contest for territory. The rebellion of Ahmed Arabi, 1881, in Egypt, was the first of a series of events which led to the establishment of a British protectorate over Egypt and the Sudan. France had gradually established an empire in Africa, some 3,700,000 sq. m. in extent; while Germany, without a foot of territory in 1884, became a serious competitor to the longer established colonial powers with its acquisi-

tion of Damaraland (South-West Africa), East Africa (Tanganyika), Togoland, and the Cameroons.

The U.K. controlled an area slightly smaller than France did; but in its command of the four great rivers, the Nile, the Niger, the Zambezi, and the Congo, and in the possession of the temperate lands of the south, it enjoyed a position incomparably more advantageous strategically and commercially. At the turn of the century the British empire controlled territory without a break from Egypt in the north to the Cape in the south, as well as the outlying possessions of Gambia, Sierra Leone, the Gold Coast and Ashanti, and Nigeria on the west coast, and of British Somaliland on the east coast.

Move towards Federation

The attainment of responsible government in the greater British colonies marked the first step towards full self-government. But the process was not always easy nor progress uniform. The Union Act of 1840 did not solve the difficulties of Canada. It had united Upper Canada (Ontario) and Lower Canada (Quebec) between which there was little in common; it left separate Newfoundland, Nova Scotia, Prince Edward Island, and New Brunswick, between which there was much in common. Conditions in Canada pointed, therefore, from the first towards a federal rather than a unitary state, and still more markedly after the opening up of the greater territories in the north-west and west. In 1864, a constitutional convention met at Charlottetown, and a scheme of federation was approved and subsequently embodied in the British North America Act of 1867.

This made Canada a federal dominion under the British crown, with a nominated senate, an elected house of commons, a privy council, and a responsible cabinet. Certain powers were allotted to the provincial governments, but residuary powers remained with the federal government. Quebec, Ontario, New Brunswick, and Nova Scotia were the original units of the federation; provision was made for the admission of other provinces, and Manitoba was admitted in 1870, British Columbia in 1871, Prince Edward Island in 1873, and in 1905 Alberta and Saskatchewan, carved out of the North-West Territory. The federal government continued to be

responsible for the North-West Territories, comprising what remained of the old North-West Territory and Rupert's Land and Yukon. Newfoundland became the 10th province in the confederation in 1949.

Australia began to move towards federation as far back as 1847, but it was 1900 before a scheme drafted in Australia was enacted by the imperial parliament as the Australian Commonwealth Act, effective Jan. 1, 1901. The component states of the commonwealth of Australia—New South Wales, Victoria, South Australia, Western Australia, Queensland, and Tasmania—occupy a position of much greater dignity and power than do the provinces of Canada. They have delegated certain functions to the commonwealth; the residue of powers remains vested in them. In the federal senate they, like the American states, enjoy equal representation. In Australia, as in the U.S.A., centripetal forces are at work, and the commonwealth has on the whole gained during the 20th century at the expense of the states. But technically sovereignty still lies with the states.

The Union of South Africa

In South Africa, as in Australia, economic and strategic considerations favoured unity, but political and cultural divisions pulled the other way. The Jameson Raid, 1896, and the South African War, 1899–1902, were the sorry sequel to precipitate action on the one hand and stubborn obstinacy on the other. In 1902 the long-drawn-out and bitter contest ended in the decisive defeat of the Boers. The most sagacious of their leaders accepted the verdict of the sword, and matters settled down so quickly that in 1907 it was found possible to confer self-government under the British crown upon both the Transvaal and the Orange River Colony (which resumed the name Orange Free State).

But colonial self-government, as in Canada and Australia, solved only partially the problems confronting South Africa. Unlike the dominions already established, South Africa had to face the difficulty that it had an African population outnumbering Afrikaners and British combined by four to one. Other considerations also pointed imperatively to a union of the four colonies, and in 1910 this was brought about. But the divisions between Boer and Briton, and indeed among the Boers them-

selves, were not healed, and a large proportion of the Afrikaans-speaking population of the Union remained mistrustful of any close association with the empire and cherished as their ideal the re-establishment of a republic. After the First Great War the Union was given a League of Nations mandate for the administration of South-West Africa, which in 1948 was incorporated in the Union.

Colonial and Imperial Conferences

In 1887 a colonial conference met in London to coincide with the celebration of Queen Victoria's Jubilee. In 1894 a similar conference met at Ottawa, and in 1897 a third conference met, again in London, to coincide with the Diamond Jubilee celebrations. At these conferences most of the colonial representatives, while resolved to maintain their ties with Great Britain, showed their opposition to federation and to any centralised imperial system such as was favoured by Joseph Chamberlain.

At the meeting held in 1902 there was support from the dominions for a policy of imperial preference which divided opinion in free-trade Great Britain. When the conference next met in 1907, two important stages in its evolution were registered: it assumed the designation "imperial" instead of "colonial," and decided to meet regularly at quadrennial intervals. The meeting of 1911 was memorable, on the one hand for the rejection of federalism and imperial preference; on the other for a remarkably full and frank exposition by Sir Edward Grey of the international situation. That exposition undoubtedly prepared the minds of overseas statesmen for the events of 1914.

The participation of the dominions in the First Great War profoundly modified their status alike in the British empire and in world politics. They passed at a single bound from the position of protected dependents to that of participating nations; and they claimed the rights pertaining to this position. Those rights were recognized by the inclusion from March, 1917, of dominion statesmen, together with representatives of India, in the imperial war cabinet. There thus came into being, under the stress of war, an imperial council; but it was not maintained in peace. Dominion statesmen preferred to rely upon the imperial conference, which was intermittent in session and purely advisory in function.

With victory won the tide of imperial sentiment ebbed and dominion governments, notably those of Canada and South Africa, were resolved to assert their newly won equality of status in form as well as in fact. "Too much of the old ideas clings to the new organism," complained General Smuts in 1917. Decentralisation was his watchword. He worked to ensure a re-definition of imperial relations in terms of equality, and he felt that the name British Commonwealth of Nations should be adopted to describe a system of states which comprised not an empire but something hitherto unknown and therefore un-named in history.

The addition of the Irish Free State to the number of the self-governing dominions under the terms of the Anglo-Irish treaty of 1921 reinforced those who desired decentralisation and re-definition. The imperial conference of 1923 took some important decisions in respect of procedure, but it was in 1926 and in 1931 that the pattern of the new Commonwealth was set.

Statute of Westminster

The imperial conference of 1926 was among the most notable of the whole series, for it established the principle for future mutual relations between the U.K. and the dominions which was embodied in the Balfour formula: "They are autonomous communities within the British empire, equal in status, in no way subordinate one to another in any aspect of their domestic or external affairs, though united by a common allegiance to the crown, and fully associated as members of the British Commonwealth of Nations." The Statute of Westminster, 1931, gave effect in law to this definition.

The dominions were equal in status with the U.K. but they were not equal in stature. The Balfour report had rightly assumed that there would be for some time a continuing inequality in function. Both in foreign affairs and in defence the major responsibility and burden continued in fact to rest with the U.K. up to, and during, the Second Great War. This created some difficulty, especially since the dominions felt that their independent status should be asserted in the international field and above all at the League of Nations. Yet on the main essentials of policy there was a remarkable degree of unanimity as the threat of Nazi and fascist aggression loomed larger. Thus at the imperial conference which met in

1937 international appeasement was accepted as the goal of Commonwealth policies, and at the Munich crisis a year later there was almost unanimous support for Neville Chamberlain.

When the policy failed, the Commonwealth prepared for war and in Sept., 1939, the older dominions decided of their own free will to fight in resistance to Nazi aggression on the side of Great Britain and France. South Africa, after an historic debate and by the narrow majority of 13 votes in the house of assembly, decided on Sept. 6 to support General Smuts in his policy of war on the side of the Allies. Canada, following the independent decision of its government and parliament, declared war against Germany on Sept. 10. Eire (the Irish Free State), no longer in its own view since its new constitution of 1937 a dominion but a state externally associated with the Commonwealth, decided to remain neutral.

The events of 1939 demonstrated at once the full freedom of members of the Commonwealth to determine their own course of action and their underlying unity of outlook. The years that followed demonstrated anew their capacity for resolute and united action in time of crisis, and the year (June, 1940–June, 1941) in which the Commonwealth stood alone remains one of the proudest memories of its peoples.

Changes in the Commonwealth

The participation of India in the war of 1939–45 was decided by the U.K. government because India, partly on account of internal division, had not attained dominion status. In 1935 the Government of India Act conferred on India a federal constitution, in which for the first time the provinces of British India and the Indian states were to be associated in the central government, while the provinces were to enjoy autonomy. The constitution did not come into force, as the requisite number of states did not accede; but elections in 1937 resulted in the formation of National Congress cabinets in eight of the 11 provinces. The Congress ministries resigned from office after the outbreak of war in 1939.

In 1942 the British government sent Sir Stafford Cripps to India with an offer of a constitution to be drawn up by Indians themselves at the end of the Second Great War. Both Congress and the Muslim League rejected the

proposal. Yet India, in spite of opposition there to British rule, raised a volunteer army of more than two million—the largest volunteer force that had ever been formed. Post-war negotiations led to the creation in 1947 of two dominions, India and Pakistan; the next few years saw the absorption into those dominions (except for Kashmir) of the princely states which had been left semi-independent under British rule. India, a republic from 1950, and Pakistan, a republic from 1956, remained within the Commonwealth at their own wish and with the full agreement of the other members, though owing no allegiance to the crown. Ceylon became a dominion in 1948.

Burma, liberated from the Japanese and given the option of dominion status or complete independence, chose independence, British rule ending Jan. 4, 1948. Except for Singapore, which remained a crown colony, Malaya was constituted a federation with internal self-government.

Eire specifically broke the link with the crown in 1949, when it declared itself a republic outside the Commonwealth; but legislation in both countries preserved their previous privileges to Irish citizens in the U.K. and British citizens in the Irish Republic.

With these changes in the composition of the Commonwealth there came some modification in its traditional outlook. Decentralisation continued to be the guiding principle of Commonwealth relations. The imperial conference lapsed after 1937; but consultation between Commonwealth governments became not less but more frequent, and the machinery for its conduct more elaborate. MacKenzie King in 1944 spoke of the system as a "continuing conference of cabinets." But for him, as for the newly self-governing Asian members after 1947, the important things were the explicit recognition of full equality in the system and its flexibility.

Economic Problems

Unity in foreign policy could no longer be assumed, while development of economically backward areas received greater attention (e.g. in the Colombo Plan). It had been thought that the Ottawa trade agreements of 1932, which brought a system of imperial preference into being, might mean that as constitutional ties became fewer, economic ties would become more important. The sterling area system (of which Canada was

not a member) and many financial and economic conferences after 1945 suggested at the least that in such matters there was a wide area of common agreement and much common interest. Asian membership also focused attention on the future of the British colonial empire, because the Asian members were opposed to colonialism.

The Colonial Empire

The British colonial empire in 1955 contained more than 60 units, controlled to a greater or lesser degree from Whitehall. British policy has consistently been the gradual development of self-governing institutions in each unit with a view to its assumption, alone or as part of a group, of responsible government within the British empire. In some of these territories, notably in the West Indies, there is a long established tradition of responsible government; but elsewhere and, especially in Africa, participation in government by the native population was the exception. In general two clear stages are to be noted: first representative institutions were established, and then the executive was made responsible to the legislature for some or all of the functions of government. In plural societies, conflict between peoples led to the introduction of communal representation, and it is where the population is homogeneous, as in West Africa, that the most marked advances towards self-government were made. In East Africa and in Malaya communal problems retarded such development. In central Africa and the West Indies federation was marked out as a step towards full self-government: the Federation of Rhodesia and Nyasaland came into being in 1953, and an act of the imperial parliament of 1956 provided for the eventual creation of the British Caribbean Federation. Side by side with constitutional experiments, which were not uniformly successful, increasing attention was devoted to economic and social problems in the colonial empire. Colonial Development and Welfare Acts, introduced in 1929 and 1940, were as indicative of the new outlook as the drafting of new constitutions.

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Empire, 1929; Survey of British Commonwealth Affairs, W. K. Hancock, 1937, 1940, and 1942; The British Overseas, C. E. Carrington, 1950; Great Britain and the Empire, J. A. Williamson, 1945; Imperial Commonwealth, Lord Elton, 1945; Survey of British Commonwealth Affairs, N. Mansergh, 1952; Democracy in the Dominions, Alexander Brady, rev. ed. 1953.

British Council. Body established in 1934 and granted in 1940 a royal charter by the terms of which its purposes are the promotion of a wider knowledge of the English language and the U.K. abroad, and the development of closer cultural relations between the U.K. and other countries. The council's funds are derived from parliamentary grants and its governing body is its executive committee, composed of members drawn from the house of commons, industry, the universities, the arts and sciences, and other fields of British life.

The council works in foreign and Commonwealth countries and in the colonies. Activities include the formation of new, and the encouragement of existing, British cultural centres, anglophil societies, and British schools abroad; the encouragement, in foreign countries, of English language teaching and British studies in universities, schools, and other institutions; and the projection of knowledge of British life and thought, particularly in the fields of literature, science, medicine, engineering, agriculture, social studies, music, drama, the fine arts, and architecture, through the medium of books and periodicals, films, exhibitions, lectures and advisory visits, study groups, etc. Scholarships and bursaries for study in the U.K. of British institutions, methods, and achievements are granted to graduates and specialists. The council's centres in the U.K. provide study programmes for professional visitors, holders of U.N. fellowships and Colombo Plan awards, and others from overseas, and welfare services for colonial and other overseas students. Its h.q. is at 65, Davies St., London, W.1.

British Electricity Authority. Body formed in 1947 to administer the electrical industry in England, Wales, and south Scotland after nationalisation in 1948. *See under Electric Power.*

British Empire, ORDER OF THE. British order instituted June 21, 1917. Consisting of two divisions, military and civil, the



Order of the British Empire, First Class; top, badge; below, the star

order is conferred for services rendered to the Commonwealth and Empire, whether at home or abroad, and is given to women equally with men. There are five classes for men, these are knight grand cross (G.B.E.); knight commander (K.B.E.); commander (C.B.E.); officer (O.B.E.); member (M.B.E.). In awards to women the two classes G.B.E. and K.B.E. are represented by that of dame commander (D.B.E.); the others are the same. These two premier classes confer the title Sir on men and Dame on women. The maximum number of members of the three highest grades is fixed as follows: G.B.E. (military), 10; G.B.E. (civil), 60; K.B.E. (military), 30; K.B.E. (civil), 180; C.B.E. (military), 140; C.B.E. (civil), 720. As regards badges, the first, second, and third classes wear as a badge a silver-gilt cross, enamelled pearl-grey, in the centre of which, in a circle enamelled crimson, is a representation of Britannia seated. The fourth class has a similar badge, smaller and not enamelled; for the fifth the badge is of silver. Originally purple, the ribbon was later changed to pink edged with silver, the military division having a narrow vertical silver stripe in the centre.

British Empire Exhibition. Held at Wembley, Middlesex, England, in 1924 and 1925. The site covered 216 acres not previously built on. The exhibits were housed in pavilions devoted to industry, engineering, etc. and each dominion and colony of the empire filled its own building with an individual display. There were also a large amusement park and stadiums for a circus, military tattoo, F.A. Cup final, etc. More than 17 million people had attended in 1924,

nearly 10 million people in 1925. The Cup final was played at Wembley each year thereafter.

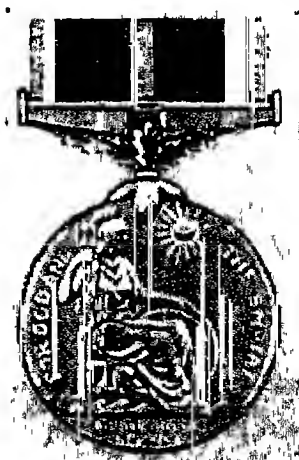
British Empire Medal. British military and civil decoration awarded for meritorious service. It was instituted in 1939 to replace the medal of the Order of the British Empire. Both medals are of silver; the ribbon, 1½ ins. long, in the military division is pink with three vertical silver stripes, in the civil division pink with a silver stripe at either edge. *See illus. in centre column.*

British European Airways. British govt.-owned commercial airways corporation formed Aug. 1, 1946, to operate all British regular air services between the U.K. and the Continent. It replaced the European division of British Overseas Airways Corporation. In 1947 B.E.A. took over all British domestic air lines, but from 1948 private cos. provided services in association with B.E.A.

British Expeditionary Force (1914-18). Official title of the U.K. and Imperial armies on active service in France and Belgium 1914-18, commanded by Sir John French (later Earl of Ypres), then by Sir Douglas Haig (later Earl Haig). The original B.E.F., the advance details of which landed at Boulogne on Aug. 7, 1914, consisted of four infantry divisions and one cavalry division, totalling 95,600 men. Immediately preceding the introduction of conscription in 1916 the B.E.F. totalled 1,150,000 men, the largest volunteer army in European history. 2,046,901 men served with the B.E.F.

British Expeditionary Force (1939-40). The move of a British force to France in 1939 began on Sept. 10. The plans for the dispatch of this force differed from those of Aug., 1914, in that the danger of attack, by sea and air, made it necessary to use the western ports of France instead of the Channel ports; the troops were landed at Cherbourg, their vehicles and stores at Nantes, St. Nazaire, and Brest. The vehicles moved by road, the troops by rail, to an assembly area round Le Mans and Laval. Lord Gort, commander-in-chief, had his headquarters at Le Mans.

The 1st corps was due to start the forward move by Sept. 26 in order to make room for the arrival of the 2nd corps. Most of the units had been hastily mobilised, and these long moves by road in a strange country were a great strain on the



British Empire medal

staff and the troops. The difficulties were overcome in a splendid spirit and were lightened by the hospitality of the French inhabitants which all ranks long recalled with gratitude.

It was now decided that the force should take over a sector of the front and come under the orders of General Georges, who commanded the N. zone of the Western front. This sector was to extend from Maulde in the S. to Halluin in the N. The 1st corps was to take over the S. half of this sector on Oct. 3 and the 2nd corps was to take the N. half by Oct. 12. The forward move of 250 miles from the assembly area was now due to start. Tanks, tracked vehicles, and the heavier kinds of artillery moved by train and the remainder of the force by road. The road move was taken in two stages and carried out with remarkably few breakdowns or accidents in spite of the fact that the units had received their transport and equipment only recently. The line was occupied without any delay. The 1st corps, with Lt.-Gen. Dill in command, had the 2nd div. (Maj.-Gen. Loyd) on the right and the 1st div. (Maj.-Gen. Alexander) on the left. The 2nd corps, with Lt.-Gen. Brooke in command, had only the 3rd div. (Maj.-Gen. Montgomery) in the line; and the French 51st div. under the command of Gen. Gort was on their left. The 4th div. (Maj.-Gen. Johnson) was kept in G.H.Q. reserve.

Waste of Mechanised Forces

Those who had pressed so hard for the progress which had been made in modernising and mechanising the army were disappointed that this magnificent force of regular troops should have been given these line-holding duties. It had been hoped that the normal French divisions with horse-drawn transport would have been used for such purposes and the highly mobile British striking force would have been kept in reserve to be launched at some vital point when required. As will be seen, it was unfortunate that this step was not taken.

The British Expeditionary Force now set to work to prepare a series of strong defensive positions on their front. There were three positions in the forward area, and a corps position in rear was sited across the Lille salient. Further in rear there was another position along the lines of the Haute Deule, Sensée, and La Bassée canals. Each position was to be

protected by an anti-tank ditch 9 ft. deep and 20 ft. wide, and the whole front was to be covered by machine-gun fire from concrete pill-boxes. The work went on at full speed and all possible use was made of excavating machinery and concrete-mixing plant.

While this work was in progress during the winter months, the commander-in-chief arranged for infantry brigades to move S. one at a time, and occupy a position on the Saar front under the command of a French div. So many junior officers and men had never seen active service that this gave them an opportunity to become accustomed to battle conditions on an active part of the front before they might be faced with the more serious operations taking place in the north.

Strength in January, 1940

During Dec. the 5th div. was formed from three independent infantry brigades, and went in on the left of the line under the 2nd corps. The 4th div. had already moved into line on the left of the 3rd div. In Jan., 1940, the 48th (Territorial) div. arrived from home and was allotted to the 1st corps. By the end of Jan. the force therefore had two corps each of three divisions with the normal corps and army troops; at that time its strength was 222,000, this figure being exclusive of air force personnel.

The air force component of the B.E.F. consisted of one bomber reconnaissance wing, one fighter group with eight wings, and two army cooperation wings, under Air Vice-Marshal Blount. Plans for strategical air reconnaissance were worked out with the Air Ministry and the French air forces. The greatest value was obtained from their photographic and reconnaissance work. On Jan. 15 Air Marshal Barratt took over command of the British air force in France, including the air component, which, however, was to remain under the operational control of the B.E.F.

During this winter much work was carried out on the lines of communication and base areas. A large forward base was established at Havre and extensive plans were prepared for the accommodation of depots, hospitals, and reinforcement camps. Opportunity was also taken to carry out military training which effected a great improvement in the efficiency of the force. Many visitors went over, including the prime minister and seven field marshals.

The King inspected the force during a visit of three days amid scenes of great enthusiasm.

Plans had been made for the dispatch of the 3rd corps early in 1940, and the B.E.F. was to be organized in two armies as soon as there were more than eleven divisions. The situation in Europe, however, and the possible threat to Norway resulted in a postponement of these moves. The 50th div. (Maj.-Gen. Martel) and the 51st div. (Maj.-Gen. Fortune) arrived at the end of Jan., but the dispatch of any further troops was postponed. One brigade of the 5th div. was sent home, and the division was kept in War Office reserve.

At the end of March the 3rd corps under the command of Lt.-Gen. Sir Ronald Adam was finally sent out to France. The 50th div. was sent up to be in reserve to the 2nd corps. The 3rd corps occupied a portion of the front on the left of the 2nd corps with the 51st div. and the 44th div. (Maj.-Gen. Osborne) in corps reserve. The 42nd div. (Maj.-Gen. Holmes) of the 3rd corps was kept near Amiens in G.H.Q. reserve. On April 9 the Germans invaded Denmark and Norway.

At the end of March it had been decided to keep a complete division on the Saar front instead of a brigade. The 51st division was therefore sent, and relieved the French 7th div. on May 7.

Shortage of Ammunition

By this time a great amount of work had been done on the defences. Over 400 concrete pill-boxes and 40 miles of revetted anti-tank ditch had been constructed. In the rear areas training camps were prepared for an armoured division and other formations and artillery practice camps were installed. The equipment situation, however, was very serious. There was a shortage of almost every type of ammunition. The only armoured forces available were one army tank brigade of two battalions. The armoured division at home was still only half-equipped and not in a fit state to go to the front. There was also a great shortage of labour for all purposes, and three second-line territorial divisions were sent to France for this purpose, but in the hope that they would also be able to continue slowly with their training. These divisions were the 12th (Maj.-Gen. Petre), the 23rd (Maj.-Gen. Herbert), and the 46th (Maj.-Gen. Curtis); they arrived in France in April.

Ever since the first arrival in France the commander-in-chief had of course been considering the part to be played by the B.E.F. in the event of the enemy advancing into Belgium. Was the B.E.F. to stand on the frontier or to advance into Belgium? This was a matter of high policy as Belgium was a neutral country. Britain had little knowledge of her plans in the event of an attack by Germany. By Nov., 1939, the French high command had decided on three alternative plans, and the British C.-in-C. had agreed as to the part to be played in each plan by the B.E.F.

Three Plans of Action

The first plan was to retain the defences which they had been constructing along the frontier and to send forward mobile troops to the line of the Escaut (Schelde). This was dropped later in favour of the second plan, which was to advance and hold the line of the Escaut and keep the defences along the frontier as a reserve position. The third plan was to advance some 60 miles and hold the line of the Dyle. The advantage of this line was that the Belgians had prepared some of the defences and the N. end was undated. It was a shorter line to hold and excluded the enemy from a larger part of Belgium. Against this, it necessitated a forward move at a very critical period and the risk of being forestalled and perhaps caught in the open by superior enemy forces. Moreover there would be no natural strength in the French position on the British right. These plans were discussed by Gort with Georges in detail on Oct. 13 and again on Nov. 16. It was decided that plans would be prepared for both these alternatives, the advance to the Escaut being known as Plan E and that to the Dyle as Plan D. Plan E was of course by far the casier to carry out. It involved sending forward mobile troops to the river Dendre to delay the enemy and prepare demolitions while the forces could easily advance on foot in one day and occupy the main positions. Plan D was eventually adopted, and the orders under this plan worked almost exactly to schedule in the actual operations.

The Germans were successful in concealing all their preparations for the advance into Belgium and Holland. It was not until the night of May 9 that reports were received of exceptional activity on these frontiers. At 5.30 a.m. on

May 10 British headquarters received a message from Georges: "Alertes 1, 2, and 3." This was the code for instant readiness for the advance into Belgium, and at 6.15 a.m. instructions were received to operate Plan D.

The 12th Royal Lancers crossed the frontier at 1 p.m. and this was zero hour. The 1st and 2nd corps advanced in accordance with the plans, though there was a slight delay as the preliminary moves of the transport had been delayed because of the short notice. The G.H.Q. command post was opened at Wahagnies, midway between Douai and Lille. The French armies on the right and left were reported to be advancing in accordance with the plan. British troops received the most cordial reception from the Belgian people.

British Advance into Belgium

There had been little interference by enemy air forces on May 10. On the 11th this increased, but was not sufficient to retard the advance. The French columns on either flank had decided to move only by night because of this danger. Gort had decided to take the risk of movement by day and night and he was justified by results. The movement on the roads was highly organized with frequent control posts. Refugee traffic was diverted on to certain roads and caused little hindrance. On the afternoon of May 11 the British forces occupied the line from Wavre to Louvain, both inclusive, with the 1st corps on the right, under the command of Lt.-Gen. Barker. The 2nd corps on the left had only the 3rd div. in the front line and held only a short front, as the Belgians were found to be holding the Louvain bridgehead. The 5th div. was released from War Office reserve and available for use in the B.E.F. The news from the Belgian army with King Leopold in command was not reassuring. Enemy forces were stated to be crossing the Albert canal in strength.

It was now necessary to co-ordinate the various operations that were taking place in Belgium, and General Billotte was put in command (as the representative of Georges) of the B.E.F., the Belgian forces, and the 1st and 7th French armies which were on the right and left respectively of the B.E.F. G.H.Q. established an advanced headquarters at Renaix on May 13. Owing to the activity of enemy tank forces on the right flank, the commander-in-chief again pressed for the British 1st

armoured division to be sent out as soon as possible. The R.A.F. carried out successful attacks on the enemy forces as they were advancing across rivers and canals, but squadrons were becoming very depleted in strength. Urgent requests were made for reinforcements and three squadrons of fighters were sent out. Air Marshal Barratt arranged some air support for the French when they were hard pressed. On May 15 the Dutch army surrendered.

Only minor attacks had so far been carried out against the B.E.F. The bombing of the communications, however, began to increase, and the flow of refugees was beginning to cause congestion. The force had ample strength to hold their position, as the 4th, 5th, and 50th divs. were up in corps or G.H.Q. reserve, but the general situation did not allow of a prolonged defence of this line. The 1st French army to the right was in considerable difficulties and was losing ground. Further serious news came from the S., and the enemy were across the Meuse between Mézières and Sedan. At 10 a.m. on May 16 Gort received orders for a withdrawal to the Escaut line, and the operation was to begin that night, though this was later changed to the night of May 17. The withdrawal was carried out without difficulty in two stages, and by the night of the 18th the B.E.F. was holding the Escaut line with six divisions disposed as follows: the 1st corps on the right with the 48th and 42nd divs., and with the 2nd div. in reserve; the 2nd corps on the left with the 1st and 3rd divs. in the line and the 50th div. in reserve; the 5th div. in G.H.Q. reserve.

Defence of Arras Prepared

During this period the encircling threat from the S. was becoming serious, and steps were taken to strengthen the local defence of Arras, where G.H.Q. rear headquarters was situated. All areas in rear also prepared for defence against sabotage or attacks from parachutists. General Petre took command of the forces for the protection of the S. flank round Arras. These included portions of the 12th and 23rd divs. and the force became known as Petreforce. The G.H.Q. command post moved back to Wahagnies on May 18.

The air forces were now obliged to move back from their more advanced aerodromes, and they operated from new airfields at Abbeville or in central France. On May 20 as a result of further



British Expeditionary Force : fighting withdrawal to the coast in May, 1940. Black lines show approximate positions of German advance on specific dates : (1) May 13 ; (2) May 15 ; (3) May 17 ; (4) May 19 ; (5) May 20 ; (6) May 25 ; (7) May 28 ; (8) May 29 ; (9) May 30 ; (10) May 31. Approximate Allied Line on May 26 is shown at (11). Lines in white refer to actions fought by Grenadier Guards during the advance into, and withdrawal from, Belgium

enemy advances the officer commanding the air component moved his headquarters to England. After that date arrangements for air cooperation had to be made through the War Office with the Air Ministry.

The enemy had now penetrated as far as Amiens with his armoured and motorised forces. On May 19 British communications were still working through Abbeville, but it was almost certain that the enemy would penetrate to the coast in the next few days. The only armoured division had landed in a half mobilised condition at Havre and was S. of the Seine. The chance of this division reaching the B.E.F. as a reinforcement was very small. There was therefore a great danger of the British, French, and Belgian forces which were round or N. of Arras being entirely cut off. The C-in-C. considered three alternative plans for these forces which included the whole of the B.E.F. except the 51st div. on the Saar front.

Counter-Attacks Impracticable

First of all a counter-attack directed S. from Arras combined with an attack N. from the Somme might have closed a corridor and rendered the position difficult for the enemy. It might then have been possible to stabilise the position along the frontier defences. Unfortunately all the information that was available pointed to the unlikelihood of the 9th French army S. of the Somme being able to concentrate sufficient force to carry out this counter-attack. Nor had the French and British forces in the N. any substantial resources for such operations. If only the highly trained and completely motorised B.E.F. had been kept back in reserve and not used initially as line-holding troops, they could now have been launched to cut across this enemy corridor, and they might well have restored the whole situation.

The second alternative was to fall back along the whole front to the line of the Somme. This would have enabled the British to re-establish communications behind a firm front. It seemed unlikely, however, that such an operation could have been carried out successfully at this stage.

The third alternative was for these forces to concentrate round the Channel ports, holding a perimeter defence line along the canals and rivers while the troops were withdrawn by sea. This last alternative would reduce the forces available for the defence of

France and a great quantity of equipment would have to be abandoned.

The most serious threat to the B.E.F. lay of course on the S. flank. A number of detached forces had been grouped together near Douai under Maj.-Gen. Mason-MacFarlane to assist in the defence on this flank, the troops becoming known as Macforce. Round Arras Petreforce was established, but had very few troops, and Arras was a vital road junction and was becoming a bastion for the defence of the S. flank. On May 19 and 20 the 50th div. was therefore sent S. to Vimy, just N. of Arras. One brigade was used to secure the crossings on the La Bassée canal, but the remainder of the division would be well placed either to defend this flank or to carry out a counter-attack. A little later it was decided to send in addition the 5th div. to Vimy, though it had only two infantry brigades. Maj.-Gen. Franklyn was to command the whole force, which became known as Frankforce. The 1st army tank brigade was also sent to join this force.

Weygand appointed C.-in-C.

On May 20 General Sir Edmund Ironside, chief of the imperial general staff, arrived at G.H.Q. and brought instructions from the Cabinet. The B.E.F. was to move S. on Amiens, attacking all enemy forces that were met, and to take up position on the left of the French army. Similar information was to be given to General Georges. Later in the day it was announced that General Weygand was to be commander-in-chief on the whole front. Gort discussed these instructions with Ironside, at his command post at Wahagnies, and gave it as his view that such plans were not practicable. They would involve disengaging seven divisions which were in close contact with the enemy and breaking through strong enemy armoured forces, while they would lay the troops open to attack in flank and rear. More important still was the fact that communications were cut and the B.E.F. would have to carry out these considerable operations without much likelihood of being able to replenish supplies of ammunition. The commander-in-chief, however, explained to the C.I.G.S. his plans for a counter-attack in the S. with the 5th and 50th divs. The C.I.G.S. agreed with this action and went on to see Billotte. The British view was

made quite clear to the French that the forces under Billotte would be finally cut off unless an attack could be launched S. towards Cambrai combined with a similar attack from the forces which were S. of the Somme.

The instructions given to Franklyn were that he should secure the crossings over the river Scarpe, E. of Arras, so as to be able to advance S.E. in cooperation with the French. Martel, commanding the 50th div., arrived at Vimy on May 19 and made a preliminary reconnaissance. He sent reinforcements to Petre in Arras. On the 20th Franklyn arrived and it was arranged that the leading brigade of the 50th div. would take over the defence of the Scarpe immediately E. of Arras. The two brigades of the 5th div. were to take over the line on the left of the 50th div. This action released the 1st French D.L.M. div., which was equipped with Somua tanks, to cooperate with the British attack on May 21. The 21st army tank brigade and most of the troops of both divisions arrived on the 20th or during the night 20th-21st. The attack was to be carried out by the 50th div., one brigade of the 5th div., and the 1st army tank brigade, under the orders of Martel, and to be launched at 2 p.m. The advance was to be made in a S.E. direction round Arras with the 1st French D.L.M. on the right flank. The attack made good progress and over 20 enemy tanks were knocked out and 400 prisoners taken.

Lack of French Support

It was hoped that French forces on the left would also attack and that support would be received from an attack of the 9th French army across the Somme. Neither of these events happened. That evening the enemy carried out a heavy air bombardment on the leading troops and concentrated strong forces against them, including an armoured division commanded by Gen. Rommel. With no support or reinforcements the British had to withdraw in face of far superior strength. During the next few days Frankforce and Petreforce were becoming hemmed in on all sides, and were ordered to withdraw N. and rejoin the B.E.F. on the night of May 23. Their action, however, had delayed the enemy for several days and materially assisted the troops in their withdrawal to the Channel ports.

Successive defence lines were now held which were usually along rivers or canals, and a new

force known as Polforce under Curtis was operating on the La Bassée canal. Several proposals were made for new attempts to cut across the enemy corridor and close the gap, but the resources were not in existence for such operations. The administrative situation was very difficult and supplies were now sent to the Channel ports. The enemy still continued to press forward on all sides. Boulogne was surrounded and the garrison was finally evacuated by sea on May 23. Calais was also invested and finally fell on May 27 after a very gallant defence. A gap was now developing between the Belgian forces in the N. and the British left flank. To close this gap the 50th div. was sent up to hold Ypres and the Comines canal with the 5th div. on the right.

It was now becoming fully realized that there was no hope of any action being taken by the French forces in the S. which would result in uniting their forces with those that had been isolated in the N. On May 26 the British government sent authority to Gort to operate towards the coast in conjunction with the French and Belgian forces. Plans were accordingly made to withdraw in stages to a perimeter defence round Dunkirk. Lt.-Gen. Adam was instructed to prepare the plans for the defence of and evacuation from Dunkirk. Troops began to withdraw behind the perimeter on the front of all three corps on May 27. On May 28 information was received that the Belgians were capitulating at midnight. The campaign, now over, had ended disastrously for the Allies. (*See also Dunkirk Evacuation.*)

Giffard Le Q. Martel

British Gazette, THE. British government newspaper published during the general strike in May, 1926. The govt. commandeered the offices of the Morning Post and issued therefrom an official news sheet. It began publication on May 5 with a circulation of 232,000, and the last issue, May 12, had a circulation of 2,209,000. (Sir) Winston Churchill was the editor.

British Guiana. *See* Guiana, British.

British Honduras. *See* Honduras, British.

British India, ORDER OF. Decoration, instituted April 17, 1837, and formerly conferred upon native officers of the Indian army. Awarded for "long, faithful, and honourable service," it lapsed in 1948. Officers of the rank of

subádar and above were eligible for the first class of the order, which carried the title of sirdar bahadur. All native commissioned officers were eligible for the second class, which carried the title of bahadur. The insignium of the order is a gold star of eight points, suspended by a crimson ribbon.



British India, Star of the Order

British India Steam Navigation Co. Ltd. British steamship company. It originated in 1855, when the directors of the East India Co. advertised for steamers to carry the mails between Calcutta and Burma. William Mackinnon, a young Scot in business in Calcutta, obtained the contract and with two steamers began to trade as the Calcutta and Burma Steam Navigation Co. In 1862 the company took its present name.



B.I.S.N. Co. house flag

The company maintains a large fleet with sailings from the U.K. to E. Africa and India, also Indian coasting services and services between India and Burma, Malaya, the Far East, Persian Gulf, Mauritius, E. and S. Africa, and Australia. The head offices are at 122, Leadenhall St., London, E.C.3.

British Industries, FEDERATION OF. Body formed in 1916 to encourage, promote, and protect British industries of all kinds. The F.B.I. speaks for industry on large issues of economic policy (though not on questions affecting rates of pay or conditions of labour) and renders advice and service to member firms on their own problems. Membership is restricted to manufacturers or producers, and individual firms or trade associations are eligible. The head office is at 21, Tothill Street, London, S.W.1.

British Industries Fair. Annual trade fair of British manufactures organized in London by British Industries Fair Ltd. The first fair was held in 1915 at the Agricultural Hall and continued annually (except during the Second Great War) at the Victoria and Albert Museum, the Imperial Institute, the London Docks, the Crystal Palace, the White City, Olympia, or Earls Court. The fair usually opened on the third Monday in May and lasted for eleven

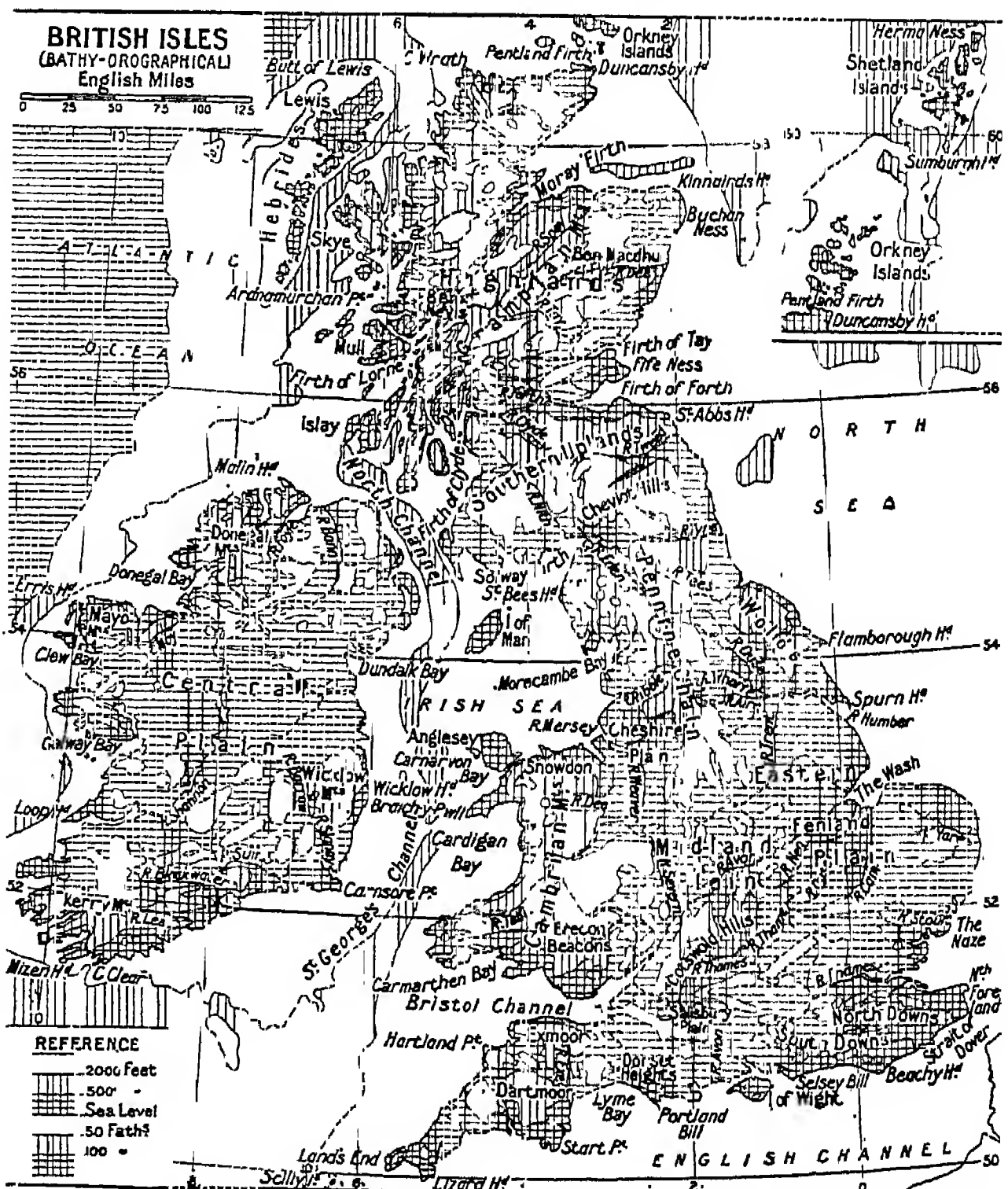
days. From 1920 an engineering and hardware section was organized at Birmingham by the Birmingham chamber of commerce.

From 1957 govt. support was withdrawn, and the fair was concentrated at Birmingham. Its aim is to promote and extend U.K. trade. Exhibits are restricted to goods manufactured within the British Commonwealth.

British Isles, THE. Archipelago of islands lying to the W. of Europe from which it is separated by the North Sea, Strait of Dover, and English Channel. The archipelago consists of two large islands—Great Britain (England, Wales, and Scotland) and Ireland—and about 5,000 smaller islands. The principal of the smaller islands are the Orkney and Shetland groups to the N. and the Hebrides to the W. of Scotland, the Isle of Man in the Irish Sea, the Scilly Isles to the S.W., the Isle of Wight and the Channel Islands to the S. of England, and islands off the mainland of Ireland. Area 121,633 sq. m. Pop. (1951) 53,330,390. See England, Scotland, Ireland, United Kingdom, etc.

British Israel World Federation. A Christian organization established to teach that the literal fulfilment of the promises and prophecies in the Bible concerning the restoration of Israel are realized in the British Commonwealth of Nations and the U.S.A., whose national development and activities exactly coincide with and fulfil the Biblical prophecies concerning Israel in the latter days. It is a non-sectarian movement of members of various denominations of the Christian Church.

The movement started as the result of a widespread interest aroused through the lectures and writing of John Wilson, especially his book, *Our Israelitish Origin*, 1840. The federation was formed in 1919, as a continuation of the work begun by earlier societies, notably the Imperial British-Israel Association. It is non-Jewish. This is a feature which arises out of the Biblical distinction between the two houses of Israel and Judah, the destinies of which are declared in the Bible to be entirely different. The British-



British Isles. Bathy-orographical map showing the variation in the relief of the land and the Continental shelf which underlies the British seas

Israel movement identifies the modern British and American nations with the tribes of Ephraim and Manasseh, to whom were given promises including that of development into a "nation and a company of nations," destined to serve and bless mankind in the last days. The headquarters are at 6, Buckingham Gate, London.

British Legion. A combination of ex-Service organizations which sprang up after the First Great War. Formed July 1, 1921, it admits all men and women who have served in the armed forces. Its aim is to safeguard their own and their dependants' interests.



British Legion badge

It is non-party; exerts its influence through ex-Service M.P.s on legislation, and cooperates in government training, rehabilitation, and employment schemes, setting an example at British Legion Village, Preston Hall, Kent, where tuberculous men are treated, employed, and housed with their families; at the Cambrian handloom weaving factory; and at the poppy factory, Richmond, where 300 men, most of them limbless, are provided with all-the-year-round work, some of them having model flats overlooking the Thames.

The Legion on Poppy Day collects nearly £1,000,000 yearly to carry on its benevolent work, which includes homes for the aged and infirm, rest homes for women, homes for children, convalescent homes, rent and food vouchers for those who are in need. The Legion has more than 5,000 branches (67 overseas), more than 3,000 women's section branches, and more than 1,000 clubs. The head offices of the organization are at 48-49 Pall Mall, London, S.W.1.

British Liberation Army. Title given to the British and Canadian forces engaged in the liberation of Europe on and after June 6, 1944. The army consisted of the 1st Canadian army and the British 2nd army, with Polish, Belgian, Dutch, and Czecho-Slovakian formations attached. On Aug. 24, 1945, it was announced that the title of British Liberation Army would be replaced by that of British Army of the Rhine. See Allied Expeditionary Force; D-day; Europe, Liberation of.

British Linen Bank. Scottish banking company. Founded in 1746 as the British Linen Company for the manufacture of linen, it soon extended its operations to banking, and by 1763 mercantile operations had virtually ceased. In Nov., 1919, it was affiliated with Barclays Bank, though retaining its individuality. Its principal London office is in Threadneedle Street, E.C.; the head office is 38, St. Andrew Square, Edinburgh.

British Medical Association. Society founded in 1832 to protect the prestige and interests of the medical profession and to promote the medical and allied sciences. The organization is a federation of local units called divisions which each year elect representatives who form the governing body. The executive is an elected council. The members, more than 67,000, include men and women in all branches of medical practice in all parts of the British Commonwealth. At the annual representative meeting and the scientific annual meeting matters of current medico-social interest and advances in clinical medicine are discussed.

Activities include not only the improvement of the conditions of medical practice but also work directly in the public interest, such as the publication of reports on nutrition, physical education, industrial health in factories, mental health, care of homeless children, medical education. Many years before the Second Great War the association made recommendations for a general medical service for the nation, and subsequently was concerned with the government's proposals for a national health service. Its journal is the *British Medical Journal*. The headquarters are British Medical Association House, Tavistock Square, London, W.C.1.

British Medical Journal, THE. Weekly organ of the British Medical Association. It publishes original articles and reports on all branches of medical science, and informed commentaries on various aspects of medicine.

British Museum, THE. One of the greatest public institutions in the world. Situated in Bloomsbury, London, it originated in the purchase for the nation of Sir Hans Sloane's collections in 1753. These collections comprised 50,000 books and MSS., 23,000 coins and medals, about 20,000 natural history specimens, and a great variety of other items. Sloane left his collections for the use of the public on con-

dition that Parliament paid his executors £20,000 for them. An Act of Parliament was passed accepting the trust and arranging for the raising by lottery of a sum of £300,000, two-thirds of which was to be divided among prize-winners in the lottery, while the remaining third provided the necessary £20,000 for the Sloane collection, £10,000 for the Harleian MSS. and charters (collected by Harley, Lord Oxford), £30,000 for investment to provide salaries for officials and necessary expenses, and the remainder for a fitting place in which to house the museum.

In 1754 Montagu House, in Great Russell Street, Bloomsbury, was purchased for £10,000, and £15,000 was spent on adapting it to its new purpose. The Cottonian collections of books and MSS. (made by Sir Robert Cotton, 1571-1631), which were already public property, and the royal collections made by successive sovereigns from the time of Henry VII, were added to the others, and the whole was named the British Museum.

It was first opened to the public on Jan. 15, 1759. For about fifty years admission was only granted to a small number of persons each day it was open, and tickets had to be applied for beforehand. It was not really accessible to the public until 1810. For using the books in the libraries, which form an important part of the museum, tickets have always been, and still are, necessary. To the Sloane and other collections which formed but the nucleus of the British Museum great additions have been made by purchase, bequest, and gift. The more notable additions include Sir William Hamilton's antiquities, £8,400, 1772; Towneley marbles, coins, etc., £28,200, 1805-14; Elgin marbles, £35,000, 1816; Burney library, £13,500, 1818; George III library, 1823.

Between 1828-57 the old Montagu House was demolished and the whole museum gradually rebuilt, under the architects Sir Robert and Sydney Smirke. In 1857 the circular domed reading-room, 106 ft. high and 140 ft. in diameter, was completed. The dome is the third largest in the world, after those at Buxton and the Pantheon in Rome. Visitors, other than privileged readers, must apply for permission to view.

The valuable natural history collections were removed to South Kensington 1880-83 (see Natural History Museum). Before the close of the century additional ground was purchased on the north

side of the museum and the King Edward VII galleries were opened in 1914.

The library, containing several million printed volumes, ranged on fifty miles of shelves, is the largest in the world. Its general catalogue, including the special sections dealing with music and maps, consists of upwards of 1,000 large volumes, arranged at circular desks in the middle of the great reading-room. To this library (with some exceptions) must be sent a copy of the best edition of every book, pamphlet, newspaper, etc., published in the U.K.; newspapers are stored at Hendon where a reading-room was opened in 1932.

In the Second Great War, as in the First, many valuable objects were moved to safer places of storage. The British Museum received several direct hits by aerial bombs. In Sept., 1940, two bombs in different raids went through the same hole without exploding, but in Nov. the glass roof of the new Parthenon gallery was destroyed, and in the great raid of May 10, 1941, ten galleries were wrecked, including the Greek vase room and Greek bronze room; and 150,000 volumes from the main book stack were lost.

British North America Act, 1867. Act of the imperial parliament at Westminster which created the dominion of Canada (*q.v.*), and so set the pattern for the constitutional development of the British Commonwealth.

British Overseas Airways Corporation. A British gov.-owned commercial air-line corporation. It was established in Nov., 1939, by the amalgamation of Imperial Airways and British Airways, and came into operation on April 1, 1940, under the chairmanship of Sir John (later Lord) Reith. In 1946 two new corporations were created: British European Airways to operate services within the U.K. and between the U.K. and Europe; and British South American Airways Corporation to operate services between the United Kingdom and South America, B.O.A.C. remaining responsible for the Commonwealth and North Atlantic services. In 1949 British South American Airways Corporation was merged with B.O.A.C. The H.O. of B.O.A.C. is at London Airport; the London terminal is in Buckingham Palace Road, S.W.1.

British Petroleum Company Limited, THE. Large British industrial undertaking which produces, refines, transports, and

distributes petroleum and its products. With its subsidiary and associated concerns it is one of the largest oil companies in the world. It was founded in 1909 as the Anglo-Persian Oil Company Limited to operate an oil concession granted by the Persian government to W. K. D'Arcy, a British subject, in 1901. Oil in commercial quantities had been found at Maidan-i-Naftun (later re-named Masjid-i-Salaiman) in S.W. Persia in 1908. A pipe-line was laid to the island of Abadan (*q.v.*) where a refinery was built, and exports began in 1912. Other large new oilfields were later added, and Persian production increased until it reached 32,000,000 tons in 1950.

The original concession was revised in 1933, and in 1935 (because Persia adopted Iran as its official name in that year) the company's name was changed to Anglo-Iranian Oil Company Limited, which it retained until Dec., 1954, when the name British Petroleum Company Limited was adopted. In 1951 the Persian parliament passed legislation declaring the company's interests in Persia to be nationalised. In Oct., 1954, a new agreement was concluded whereby the operation of the Persian oil industry was undertaken by an international consortium of eight leading oil companies, in which Anglo-Iranian had a 40 p.c. share.

The company also had a half interest in the oil production of Kuwait and approximately a quarter interest in that of Iraq and Qatar, besides interests in various stages of development in other parts of the world. In addition, it was the only commercial producer of petroleum in the U.K., where it had refineries at the Isle of Grain, Kent; Llandarcy, Wales; Grangemouth and Pumpherston, Scotland. It had refineries abroad, some its own, some owned jointly with other companies, at Dunkirk and Laver, France; Antwerp, Belgium; Hamburg, Germany; Porto Marghera, Italy; Haifa, Israel; Melbourne and Kwinana, Australia; and Aden. Its marketing system, covering many countries of the world, was served by its shipping organization, the British Tanker Company Limited, which owned more than 150 ships, one of the largest privately owned fleets of shipping in the world.

British Pharmaceutical Codex. Book, first published in 1907, containing information on all drugs and medicinal preparations

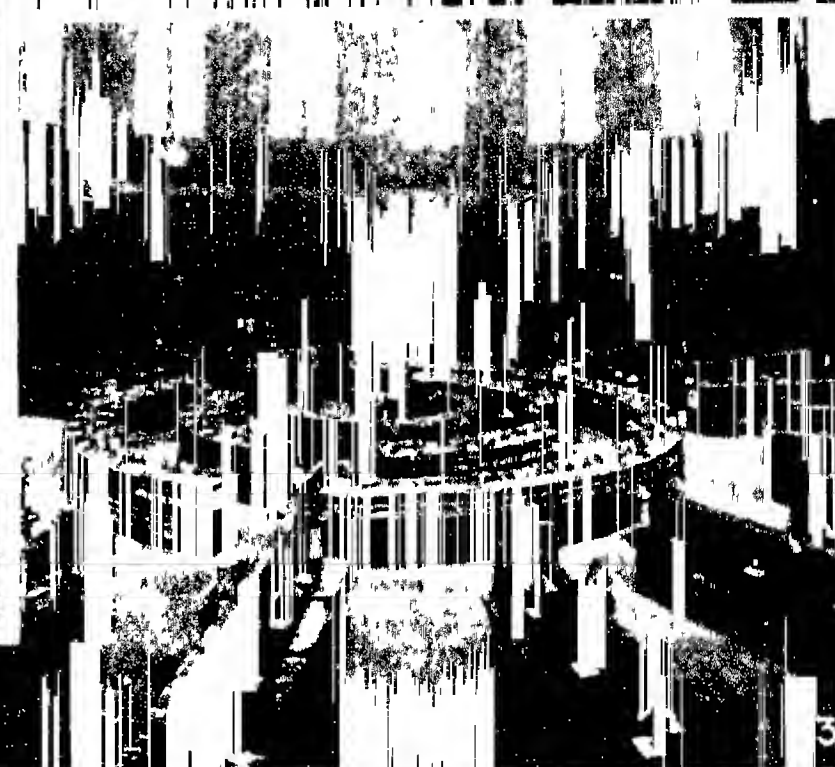
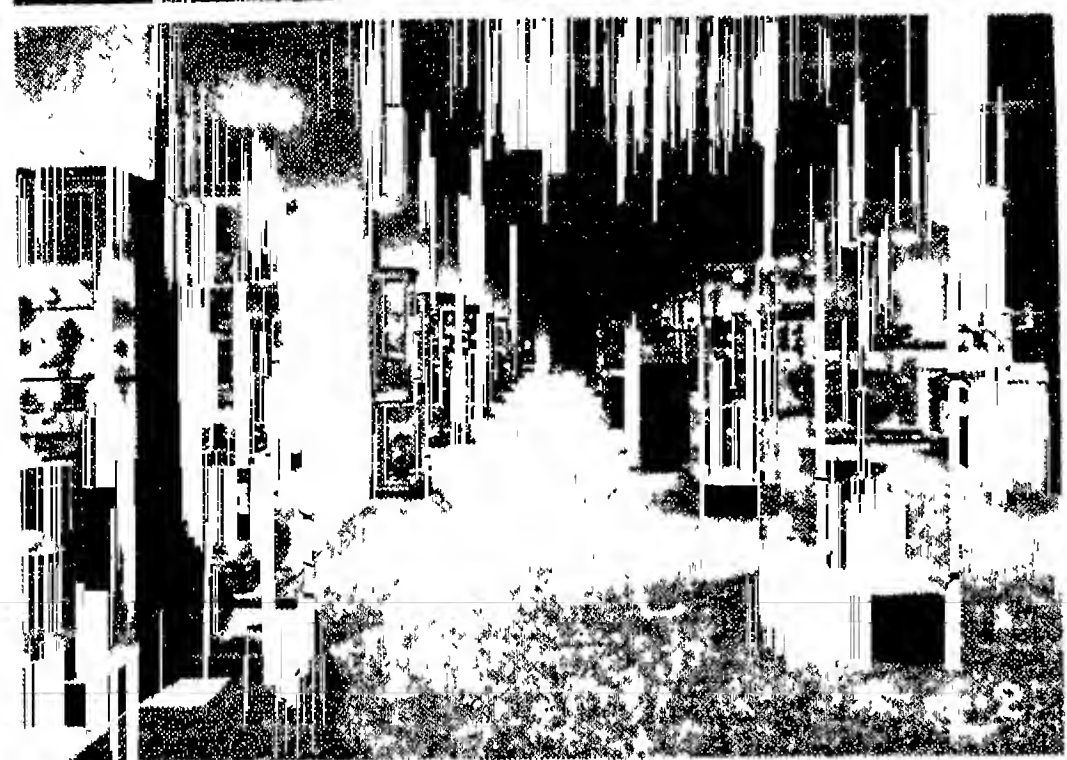
in common use throughout the British Commonwealth, and on all the principal substances which were official in the pharmacopoeias of France, Germany, and the U.S.A. The B.P.C. is revised and re-issued every 5 years.

British Pharmacopoeia. A book containing descriptions and standards for medicines, preparations, materials, and articles used in medicine, surgery, or midwifery as may be directed by the General Medical Council, which has the exclusive right to publish, print, and sell it. New editions and amendments are published from time to time. The British Pharmacopoeia came into existence under the Medical Act, 1858. Before this act there had been different pharmacopoeias in England, Scotland, and Ireland.

British Railways. Name adopted for the railways of the U.K. on their nationalisation, Jan. 1, 1948. They are administered by the British Transport Commission (*q.v.*) and are organized into six regions: Southern, Western, London Midland, Eastern, North Eastern, Scottish. After a period of experiment uniform colourings for locomotives (blue for main line, green or black) and coaches (crimson lake, with cream panels added for main line, and green for multiple-unit electric coaches) were introduced in 1949. The Transport Act, 1953, provided for re-organization of the railways, and a 15-year plan for modernisation was started in Jan., 1955. Its estimated total cost was £1,240,000,000; one of its chief features was the replacement on certain lines of steam locomotives by electric and Diesel traction.

British Road Services. Title of the road haulage services acquired and operated by the Road Haulage Executive on behalf of the British Transport Commission. By an act of 1947 the gov. took over the carriage by road of all goods necessitating journeys of more than 25 m. from a dispatch point. The only exceptions were road services operated by manufacturers transporting their own products. In 1952 British Road Services were operating 36,000 vehicles on local and trunk routes. An act of 1954 abolished the Road Haulage Executive, and returned the bulk of road transport to private enterprise. The B.R.S. fleet was reduced to 7,750 vehicles, all operating trunk services.

British South Africa Company. Chartered company which administered Rhodesia 1889-1924. The charter, granted July 13, 1889,



1. Colonnaded façade completed 1852, forming the main entrance to the British Museum, Bloomsbury, London. 2. The Ceramic gallery, in the King Edward VII building. 3. The famous reading room (books) in the main building; the newspaper collection and reading room were

moved to Hendon in 1932. 4. Natural History Museum, S. Kensington, which forms part of the British Museum: it was opened 1881. 5. Inside the lofty central hall of the Natural History Museum; a first glimpse of the finest natural history collection in the world

BRITISH MUSEUM: STOREHOUSE OF MANY OF THE WORLD'S TREASURES

Courtesy of the British Museum and Natural History Museum

at the instigation of Cecil Rhodes, empowered the company to develop the territory afterwards called Rhodesia in which Rhodes and his associates had already obtained concessions. The charter was granted for 25 years. The company's powers were partly administrative, as its officers collected taxes; but it was also a great trading concern. It let out land to settlers, encouraged mining enterprises, maintained ranches and experimental farms, constructed railways, and carried on wars with the native Africans. The authorised capital was £9,000,000.

In 1914 the charter was tacitly renewed for 10 years. The question of the ownership of the land was referred to the judicial committee of the privy council, which in 1918 pronounced that the crown was the owner of the unalienated land but that the company could dispose of it in the ordinary way as long as it was responsible for the government. From Oct. 1, 1923, when Southern Rhodesia began its career as a self-governing colony of the empire, the company ceased to be responsible for the administration of the territory, though it remained in control of Northern Rhodesia for another few months.

British Standards Institution. Organization in the U.K. for preparing and issuing standards of quality in manufacture and workmanship. It was formed in 1901 when the Institution of Civil Engineers, the Institution of Electrical Engineers, the Iron and Steel Institute, and the Institution of Naval Architects formed a joint engineering standards committee. In 1929 the committee was granted a royal charter and assumed the title British Standards Institution. The institution's standards, although their acceptance is voluntary, are recognized by the govt. and industry as standards of national application other than those expressly dealt with by special acts of parliament. By the mid-20th century some 2,500 British Standards had been issued; they are periodically reviewed.

Members of the B.S.I.'s 60 industry standards committees are drawn from industry; govt. departments; and professional and scientific and technical bodies. They prepare standards authorised by the following divisional councils: building, chemical, engineering, and textile. Functioning parallel to the divisional councils is the council for codes of practice.

British standards cover: terms and definitions; quality; methods

of test; methods of use (codes of practice); safety requirements; dimensional requirements. The standards are designed to promote greater and more economical production; improved quality and easier servicing of products; ready availability of replacement parts; accurate assessment of efficiency of apparatus and machinery; unification of technical terms, symbols, and abbreviations; public safety.

The B.S.I.'s income derives principally from annual subscriptions from trade associations, technical institutions, and firms, sales of its publications, and an annual government grant. It publishes a monthly information sheet and a yearbook, together with an annual report. The offices of the Institution are at 2, Park St., London, W.1.

There are similar standards organizations in some 38 countries, and the International Standards Organization integrates their work with a view to international unification of national standards.

British Subject. A citizen of the United Kingdom and colonies or of one of the other units of the British Commonwealth. There is also a relatively small group of persons who are British subjects but are not citizens of the U.K. and colonies or of any other of the Commonwealth countries.

The principle governing British nationality was revolutionised as the result of a Commonwealth conference in 1947. Previously there had been only one class of British subjects, a British subject having the same status whether he belonged to the U.K. or one of the other countries of the Commonwealth. This was the rule laid down in the British Nationality and Status of Aliens Act, 1914, and in legislation on similar lines in the other countries of the Commonwealth as part of a common code. The increasing freedom of the self-governing countries of the Commonwealth had made it desirable that British subjects belonging to one of the overseas countries of the Commonwealth should be associated in some particular way with that country instead of being merely British subjects generally. Accordingly a conference of Commonwealth representatives held in 1947 decided that each country of the Commonwealth should have its own citizenship governed by its own laws, but that everyone who was a citizen of any Commonwealth country should be throughout the Commonwealth a British subject or Commonwealth citizen. There were thus to be nine classes

of British subjects: Citizens of (1) the U.K. and colonies, which included the Channel Islands, the Isle of Man, and such colonies as were not included in any of the Commonwealth countries; (2) Canada; (3) Australia; (4) New Zealand; (5) The Union of South Africa; (6) India; (7) Pakistan; (8) Southern Rhodesia; (9) Ceylon. There was originally a tenth class (citizens of Newfoundland) until Canada and Newfoundland were united in 1949.

THE 1948 ACT. The British Nationality Act, 1948, passed by the U.K. parliament, which brought this new principle into force so far as concerned the U.K. and colonies, contained provisions relating to person who were British subjects on Dec. 31, 1948, *i.e.* immediately before the act came into force. In general these became citizens of the U.K. and colonies if they then had certain qualifications indicating a connexion with the U.K. and colonies—*e.g.* if they had been born or naturalised in the U.K. or the colonies. Whether a British subject became a citizen of one of the Commonwealth countries with which he had a connexion depended on the laws of that country. Persons who on Dec. 31, 1948, were British subjects, but not citizens of any overseas Commonwealth country because the country of which they were potential citizens had not passed a citizenship law, became British subjects without citizenship until such a law was passed. After the passage of such laws, any British subject who did not become a citizen of an overseas Commonwealth country became a citizen of the U.K. and colonies.

After the act came into force on Jan. 1, 1949, citizenship of the U.K. and colonies could arise by birth, by descent, by registration, by naturalisation, or by incorporation of territory. All persons born within the U.K. and colonies after Dec. 31, 1948, are citizens by birth, whatever their parentage, save in a few exceptional cases (*e.g.* children of members of the diplomatic corps).

A person born outside the U.K. and colonies after Dec. 31, 1948, is a citizen of the U.K. and colonies by descent if his father was a citizen otherwise than by descent at the time of his birth. If his father was a citizen only by descent, then the person will not in general be a citizen unless, if he is born in a foreign country, his birth is registered at the U.K. consulate or if he is born in a

Commonwealth country he, for some reason, is not entitled to citizenship by birth of that Commonwealth country by its laws. Thus, if citizens of the U.K. and colonies emigrate, their citizenship of the U.K. and colonies persists for two generations through males, subject to registration, but persists in overseas Commonwealth countries for only one generation unless the second generation for any reason does not acquire citizenship of the Commonwealth country. Citizenship of the U.K. and colonies is thus more readily relinquished in an overseas Commonwealth country than it is in a foreign country where, when it is relinquished, the person will become an alien.

A person of full age and capacity who is a citizen of any unit of the Commonwealth or of the Irish Republic is entitled to become a citizen of the U.K. and colonies by registration on application to the Home secretary if he has certain qualifications, *e.g.* has been ordinarily residing in the U.K. for 12 months.

The Home secretary has power to grant certificates of naturalisation to aliens and British protected persons who possess certain qualifications (*see* Naturalisation).

When any territory becomes a part of the U.K. and colonies, *e.g.* by conquest, orders in council may be made specifying in what circumstances persons living in or connected with that territory may become citizens of the U.K. and colonies.

MARRIED WOMEN. The act of 1948 made great changes in the nationality law relating to married women. Before that act if a woman who was a British subject married an alien, she ceased to be a British subject, and if a woman who was an alien married a British subject she became a British subject. In marriages after the act of 1948 came into force, a woman who is a citizen of the U.K. and colonies retains her U.K. citizenship despite marriage to an alien; and an alien woman who marries a U.K. citizen does not automatically become a U.K. citizen although she may become one by registering.

A woman who lost her British nationality by marrying an alien before 1949 is considered to have been a British subject on Dec. 31, 1948. The result is that when the act of 1948 came into force on Jan. 1, 1949, such a woman in general became a citizen either of the U.K. and colonies or of one

of the overseas Commonwealth countries, depending on the country with which she had been connected—*e.g.* in which she had been born. A woman who had acquired British nationality by marriage before 1949 with a British subject became a British subject from Jan. 1, 1949, if her husband became a citizen of the U.K. and colonies, or would have become one had he been alive.

IRELAND. Under the Ireland Act, 1949, the Irish Republic ceased to be part of the British Commonwealth. Its citizens are not British subjects, but on the other hand they are not aliens and in the U.K. are for most purposes treated as British subjects. Certain persons born before Dec. 6, 1922, in the territory covered by the Irish Republic became citizens of the U.K. and colonies on Jan. 1, 1949, if they satisfied certain requirements; and a citizen of Eire (as southern Ireland was called during 1937–49) who was a British subject on Dec. 31, 1948, became a citizen of the U.K. and colonies if he satisfied certain other requirements—*e.g.* he or his father was born within the U.K. and colonies. Any citizen of the Irish Republic can apply to be registered as a citizen of the U.K. and colonies if he has certain qualifications, *e.g.* if he has been ordinarily resident in the U.K. for 12 months. As he is not an alien, he cannot be naturalised.

BRITISH PROTECTED PERSONS. These are persons in a protected or trust territory in respect of which an order in council has been made declaring certain classes of the inhabitants to be British protected persons. They are not British subjects nor are they aliens for the purposes of alien restrictions; but they are aliens to the extent that naturalisation as citizens of the U.K. and colonies is available to them.

British Transport Commission. Body responsible in the U.K. for public land transport, and for port facilities. It was established under the Transport Act, 1947, and at first delegated the administration of the services which it directs to five executive bodies: the railway executive, London Transport executive, road haulage executive, docks and inland waterways executive, and hotels executive. On Jan. 1, 1948, all the nationalised forms of transport were vested in the commission. The Transport Act, 1953, provided for the reconstitution of the commission. As an interim

measure, under an order of the ministry of Transport, the functions of all the executives except London Transport were assumed by the commission from Oct. 1, 1953. Its h.q. is at 222, Marylebone Road, London, N.W.1.

British War Medal. Decoration granted to all ranks of the British Imperial, and Colonial military, naval, and air forces who served overseas between Aug. 5, 1914, and Nov. 11, 1918, and to naval personnel who served in N. Russia 1918–19. The medal is of silver. Ribbon: orange watered centre with stripes of white and black at each side with royal blue borders.

Britomartis (sweet maiden, or maiden rich in blessing). Cretan goddess, daughter of Zeus and Carme. She was the virgin patroness of the chase and fishing, and as such eventually became identified with Artemis. She was worshipped on the islands and coasts of the Mediterranean as far W. as Marseilles, and at Aegina under the name of Aphaea. Early myth makes her leap into the sea to escape the embraces of Minos, king of Crete; she fell into some fishing nets, and was turned into a goddess by Artemis. Hence she shares with Artemis the name of Dictynna (Gr. *diktyon*, net). From her disappearance in the sea like the setting moon Britomartis is sometimes regarded as a moon goddess, another link with Artemis.

Brittany (Fr. Bretagne). One of the provinces into which France was divided before the Revolution. Earlier still it was an independent duchy. In the N.W. of France, it is a peninsula bounded seawards by the English Channel and the Atlantic Ocean; neighbouring provinces were Normandy, Maine, Anjou, and Poitou.

The First Great War brought Brittany into closer touch with the outside world, and changed the outlook of its inhabitants. Unquestioning religious faith, formerly widespread, ceased to be general. Ready-made clothes replaced the beautiful Breton costume. Legends no longer played so large a part in the people's lives, and although some young people continued to use the Breton language, all learned to speak French. Industry spread, changing dreamy peasants into workmen; emigration increased. But the religious festivals called "pardons" survived, the people bringing out their Breton dress for the occasion.

The chief town of Brittany is Rennes. The largest river is the



Brittany. Examples of picturesque Breton costumes rarely worn except on special occasions

Vilaine. The country is rugged; but much of it nevertheless is devoted to agriculture.

As Armorica, Brittany formed part of the Roman empire. Its Celtic inhabitants refused to submit to the Frankish kings, and kept themselves, in fact if not in name, independent. For two centuries from A.D. 460 Celts from Britain, hard pressed by Angles and Saxons, poured in and brought new life to the country that had been devastated by the Northmen. It was from this time that Armorica was called Brittany. About the year 1000 one of the local counts took the title of duke of Brittany, and soon Normandy and Brittany were at war. Henry II of England secured the duchy for his son Geoffrey, but when Geoffrey's son Arthur was murdered by his uncle John this connexion came to an end, and Brittany passed to another family. After 1341 the land was ravaged by a struggle between the rival houses of Blois and Montfort, each claiming to have inherited it. In 1364 Montfort, who was supported by England, prevailed, and his successor grew in power.

The virtual end of Brittany's independence came shortly before 1500. Duke Francis II joined a league against the king of France. His duchy was invaded, his army decisively beaten at Fougères in 1488, and he himself forced to sign a humiliating treaty. He died soon after, and his daughter and heiress Anne became the object of much attention on the part of the princes of Europe. Maximilian, the future emperor, was a suitor, and the two were married by proxy.

Charles VIII of France entered Brittany with an army and compelled the duchess to come to terms with him. Maximilian was repudiated and Anne became the wife of the king of France.

While Ann lived Brittany retained much of its independence, and in 1532 this was solemnly confirmed by Francis I. Members of the royal family filled the office of duke, but when, in 1547, one of these royal dukes became king as Henry II the office was abolished, and the duchy was united to the crown of France. The estates (parliament) of Brittany endured until the Revolution; and Brittany was one of the most tranquil parts of France during the 16th, 17th, and 18th centuries. The former province is divided into the departments of Loire-Inférieure, Ille-et-Vilaine, Morbihan, Côtes-du-Nord, and Finistère.

Britten, (EDWARD) BENJAMIN (b. 1913). British composer and pianist whose operas received world-wide recognition. Born at Lowestoft, Nov. 22, 1913, while still at school he studied piano-forte with Harold Samuel and composition with Frank Bridge, and won a scholarship to the R.C.M. The first work to bring him international notice was his *Variations on a Theme by Frank Bridge*, played at the Salzburg festival of 1937. During 1939-42

he was in the U.S.A., where his *Sinfonia da Requiem*, 1940, was given in New York. The *Serenade* for tenor, horn, and strings was given at Wigmore Hall in 1943, with Peter Pears and Dennis Brain as soloists. The *Spring Symphony* (with solo voices and chorus) was performed at the Albert Hall in 1950.

Britten's compositions have a strongly individual style, economical as to scoring and with a liveliness in mood that made them instantly popular. His operas, perhaps more favourable to the orchestra than to singers, include *Peter Grimes*, 1945; *The Rape of Lucretia*, 1946; *Billy Budd*, 1951; *Gloriana*, 1953 (commissioned by Elizabeth II for her coronation); and *The Turn of the Screw*, 1954. In association with the English Opera Group, he founded Aldeburgh annual music festival. He was made C.H. in 1953.

Brittleness. The tendency of a metal or of a metal article or structure to fracture. The brittleness of a metal is an indefinite property, and the term may refer to two different faults. (1) A material may be regarded as brittle when it breaks easily under load with little previous deformation. Here brittleness is the converse of ductility and should not be confused with lack of strength, for some materials, e.g. glass fibres, have great strength though they are very brittle.

(2) Brittleness may be lack of shock-strength, although some materials of low shock-strength have high ductility. In this sense, it is the converse of toughness.

Brittle Star OR SERPENT STAR. Marine animal resembling a star fish, but with long and slender arms which are capable of relatively rapid movement and do not contain extensions of the body cavity. Brittle stars usually have five arms radiating from a central disk which forms the main body.

Brittle stars are echinoderms belonging to the order Ophiroidea. They derive their popular name from a habit of breaking off portions of their arms when removed from the water or otherwise interfered with: the broken arms are made good by regeneration. They are exclusively marine animals, and are found in most regions of the world. Their favourite haunts are sandy or muddy seabeds, but they also hide in the crevices of rocks and corals. The sexes are, almost without exception, separate, and the embryos develop into freely floating larvae.



Benjamin Britten, British composer

which help to bring about the wide geographical distribution of the different species. Their food consists in the main of small crustaceans and molluscs, obtained by capture with the arms or by shovelling mud into the mouth.

Britton, COLONEL. Pseudonymous B.B.C. broadcaster to occupied Europe during the Second Great War. He gave instructions in the "V" campaign (*q.v.*) carried out by anti-Nazi workers and other civilians who were outwardly co-operating with the German authorities but really hampering them by sabotage, boycotting, etc. It was later revealed that "Colonel Britton" was Douglas Ernest Ritchie (b. 1905) a B.B.C. journalist, head of B.B.C. publicity from 1950.

Brive la Gaillarde (anc. Briva Curretia). Town of France in the dept. of Corrèze, on the river Corrèze, 16 m. S.W. of Tulle. It has picturesque old houses and the 12th-century church of St. Martin. Centre of an area growing early vegetables, it makes foie gras, luxury preserves, wooden shoes, radio valves and sets, and motor car bodies. Slate and sandstone are quarried near by. Pop. (1954) 36,088.

Brizen. German form of Bressanone (*q.v.*).

Brixham. Urban dist., sea-side resort, and market town of Devon, England. Attractively situated on the slopes of a hill running down to the sea at the south end of Torbay, 31 m. S. of Exeter, it has a secure harbour protected by a breakwater 1,000 yards long, the h.q. of a fishing fleet. There are ship-building yards and an oil fuel station. Paints, ferrous and non-ferrous castings, and precision tools are made. There is a limestone quarry at Berry Head, a well-known landmark and viewpoint with a coast-guard station and lighthouse, and forts built in the Napoleonic Wars. William of Orange landed at Brixham in 1688 and there is a statue of him in the inner harbour. H. F. Lyte, author of the hymn Abide With Me, was rector here during 1823-44.

A cavern, 600 ft. long, containing bones of many extinct animals, was discovered accidentally in 1858. Pop. (1951) 8,756.

Brixlegg. Village of Austria, in the prov. of Tirol. Picturesquely situated on high ground near the river Inn, 20 m. by rly. N.E. of Innsbruck, it is a summer resort. Copper and lead are smelted in the vicinity. Pop. (1948) 1,862.

Brixton. Residential and commercial district of S.W. London, 3 m. S. of St. Paul's, in the metropolitan borough of Lambeth. The high road from Kennington to Streatham runs through it and is here a popular shopping centre. At the bottom of Brixton Hill stand the municipal offices of the borough of Lambeth, and Brixton parish church. Brixton prison, the L.C.C. school of building, and the City of London almshouses built to celebrate the passing of the first Reform Act of 1832, lie within it. In Blenheim Gardens is a windmill tower. Early in the 19th century Brixton Hill was the residence of many rich merchants. The district changed its character to include many theatrical lodgings and motor-car sale businesses. Brixton borough constituency includes the dist. of Stockwell.

Briza (Gr. *brizein*, to nod). Small genus of grasses of the family Gramineae, most of them native to temperate regions. They are characterised by their large oval spikelets and very slender stems. Owing to the lax structure of the panicle and the hair-like branches, the spikelets are in constant motion, which has earned for them the popular names of quaking grass and totter grass.

B. maxima is imported from S. Europe for use in floral decoration; *B. media* of British heaths and meadows is a favourite ornament.

Brno (Ger. Brünn; Pol. Běno). City of Czecho-Slovakia, 115 m. S.E. of Prague at the confluence of the Svitava and Svatava rivers, capital of the region of a same name, formerly the capital of Moravia. The old town is surrounded by 19th-century manufacturing and residential suburbs. The fortress of Spilberk (Spielberg), dominating the city on the W., was in turn residence of the margraves of Moravia and an Austrian political prison. Silvio Pellico, Italian poet and patriot, was imprisoned here.

Seat of an R.C. bishopric, Brno has a 15th-century cathedral. The Gothic church of St. James has good stained glass, and there are fine frescoes in the church of the Minorites. Other notable buildings are the 16th-century Rathaus and the Statthaltereier or government building, once an Augustinian convent. The Czech university here was founded in 1918, and there is also a technical college.

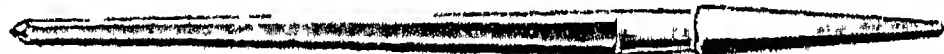
A centre of the cloth industry, Brno manufactures wool, cotton,

silk, textile machinery, motor cars, electrical goods, leather, beer, spirits, flour, sugar, gloves, hardware, and armaments, especially the Bren gun, which takes its name from the city. There is an airport at Cernovice. Pop. (1947) 273,127.

Brno became a city in 1243. It was unsuccessfully besieged by the Hussites in 1428; by King George of Bohemia in 1467; by the Swedes in 1645; by the Prussians in 1742. Napoleon made it his h.q. before Austerlitz, 1805. It was occupied by Hitler's German troops on March 15, 1939, and during the Second Great War became a supply centre for German armies engaged on the Russian front. It was taken by the Russians on April 26, 1945.

Brno region has an area of 2,876 sq. m.; pop. (1947) 934,437.

Broach. Metalworker's five-sided tool for enlarging a hole. Broaches are made of hardened steel and taper gradually from the shank to the point. They are made in tiny sizes for watch and clock pivot holes, and in a bigger range extending from $\frac{1}{8}$ in. diam. to $\frac{1}{2}$ in. The shank is tapered for fitting to a wooden handle or for holding in



Broach. Steel tool for enlarging a hole in metal

an adjustable chuck. In use, a hole of approximately the correct diameter is drilled in the metal, and then a broach of suitable size is inserted and turned until the part to be fitted will enter the hole. Broaching is also used to ensure that holes in two paired members are coincident; the members are gripped in a vice in proper alignment, and the broach is passed through holes in both and rotated.

Broach. District, sub-division, and city in the N. of Bombay state, India. The district, enlarged in 1949 (area 2,911 sq. m.), is famous for its cotton, other crops being millet, wheat, and tobacco. Timber is produced in the E. Broach city is one of the oldest seaports in western India. It stands on the Narbada river, about 200 m. N. of Bombay, and makes cotton and flour, exporting raw cotton, cereals, and some manufactured goods. It is a railway and trade centre. An English factory was established here in 1616, a Dutch factory in 1617. Pop. (1951) dist., 706,035; city, 62,729.

Broad. River of the U.S.A. Rising in the Blue Ridge mts. in N. Carolina, it flows S. and

joins the Saluda at Columbia in S. Carolina to form the Congaree. It is 220 m. long (140 m. navigable).

Broad Arrow. Mark placed on naval and military stores and other government property in the United Kingdom; also formerly on convicts' clothing. Its use replaced that of the rose and crown. An inverted pheon or broad arrow belongs to the arms of the Sidney family; it is said that Henry Sidney, earl of Romney, master-general of the ordnance in the 17th century, used this mark to identify government property (slightly simplified from its heraldic shape), and from his day its use continued. By an act of 1875 all unauthorised persons in possession of goods marked with the broad arrow are liable to a fine.



Broad Arrow,
Government
mark

Broadbent, SIR WILLIAM HENRY (1835-1907). A British physician. The son of a woollen manufacturer, he was born at Lindley, Yorkshire, Jan. 23, 1835. After spending two years in his father's mill, he studied medicine in Manchester at Owens College and the school of medicine. M.R.C.S. in 1857, Broadbent was physician to Queen Victoria and to Edward VII. He was a leading authority on heart disease, and devoted much time to the treatment of tuberculosis. Created baronet 1893, he died July 10, 1907. *Consult Life, M. E. Broadbent, 1909.*

Broadcasting. Transmission by radio of speech, music, or other sound signals—also of visual signals by means of television—to all who care to tune a receiving set to the appropriate wavelength. (Television, a later development, is, except for British law, dealt with under its own heading.) Sound broadcasting originated in the years immediately following the First Great War, through the enthusiasm of amateurs who made a hobby of "listening in" on home-built sets to the experimental wireless telephony signals of radio manufacturing firms; and through the business acumen of those firms, which sought to encourage the spread of the hobby, and therefore the sale of their goods, by making the signals more entertaining.

By 1921 many stations in the U.S.A. were transmitting regular entertainment to an increasing number of listeners, the revenue being obtained by the sale of "time" to advertisers. Any

advertiser or advertising agent was free to open a station, and there were soon far too many competing programmes for the limited wave-band available. Clear reception became impossible. Only gradually did the competing firms combine in their own interests, rationalising their transmissions so that both transmission and reception could be improved.

Beginnings in the U.K.

Development in the U.K. was slower, being impeded by the initial attitude of the Post Office, in which all authority for wireless communication was vested. An experimental station of the Marconi co. at Writtle, near Chelmsford, which had been transmitting as early as 1919, and from which Melba had been one of the first artists to broadcast, was closed down by order. Only after constant pressure, on the one hand from the amateur enthusiasts, represented by the Radio Society of Great Britain, and on the other hand from the radio manufacturers, was the Post Office persuaded to relax its attitude. Then, because of the few wavelengths available and in view of what had happened in the U.S.A., the government decided to grant a monopoly of broadcasting in the U.K. to a single company, to be capitalised and launched by the manufacturers. Revenue was to come only from the sale of government licences for the possession of receiving sets. The British Broadcasting co. began to broadcast regular programmes from London, Birmingham, and Manchester in Nov., 1922. In 1927 the responsibility for all broadcasting in the U.K. was vested in the British Broadcasting Corporation (*q.v.*), and its monopoly remained in force until the setting up in 1954 of the Independent Television Authority (*q.v.*), which was permitted to derive revenue from advertisers.

Broadcasting developed with extraordinary rapidity into one of the world's most highly organized industries, an incalculable sociological and political influence—and one which proved a formidable weapon of total warfare.

Its administration differs in every country (*see below*), but usually presents some form of compromise between two extremes as exemplified by the U.S.A., where it is free of all state control and entirely commercial, and Germany under the Nazis, where it was wholly tied to the state through the

ministry of propaganda. Free competitive broadcasting is generally called the American system; administration involving a measure of state control is called the European system. The tendency under free competition is for broadcasting to be lively, enterprising, popular, concerned primarily with giving the public what it wants; under a measure of state control the tendency is towards restriction and stereotyped formality. But this generalisation need not be pressed too far.

CONTENT OF BROADCASTS. Information, instruction, entertainment: almost everything that is broadcast falls into at least one of these categories, though it is not easy to establish any hard and fast boundary lines between them. Among broadcasts that are primarily informative are public announcements, weather forecasts, time signals, news bulletins, and direct broadcasts of public events as they occur. Instructional broadcasts comprise all those with an educational or didactic purpose. Only one stage removed from this is broadcast propaganda, commercial, political, or religious: the advertiser's patter, the electioneering speech, the charitable appeal.

Broadcast Entertainment

In entertainment music has the place of honour, accounting in one form or another for 50 p.c. of the world's broadcast output. Programmes involving dramatic form of some kind have varied in popularity as in quality and achievement. Certain conventions were quickly evolved for the effective presentation of plays and other dramatic material in terms of pure sound. This was so especially in the U.K., pre-Nazi Germany, and (later) the U.S.A. But drama was fated to be one of the fields in which television most quickly demonstrated its obvious superiority as a medium.

Almost every broadcasting system sets aside regular periods for the entertainment of children. The broadcasting of religious services (as distinct from sermons) is in a category of its own.

Broadcasts made directly from public performances in theatres, music halls, concert halls, etc., like broadcasts of public speeches, are addressed only incidentally to the radio listener, whom they put into the position of a licensed eavesdropper. Such broadcasts are comparatively unsatisfying

except for conveying a sense of sharing in an important occasion, though judicious commentary may help to sustain the listener's sense of his own importance. The more usual practice, if an audience "in the flesh" is desirable for effect, is for the broadcasting authority to admit such an audience to its own studio to fulfil a secondary rôle; in the best programmes of this kind the visible audience become the eavesdroppers, the performance itself being directed primarily at the unseen audience.

The use of gramophone records, invaluable in the earliest experimental days, has developed into the pre-recording of many programmes, ensuring a wider choice of performers, a greater approximation to perfection in performance, and above all the opportunity of unlimited and exact repetition.

The potentialities of broadcasting as a political instrument became increasingly clear during the 1930s. In a British house of commons debate of 1932 many speakers dealt with it only as a new means of electioneering. It was left to Nazi Germany to exploit its political power to the full. The Nazi propaganda ministry openly declared broadcasting to be a means of "psychological infection," declaring that "even its cultural, entertainment, and current history broadcasts serve a higher political order." Mass listening in Germany was encouraged, and later enforced. Collective listening has also been developed in other countries under a totalitarian regime, notably in the U.S.S.R.

Broadcasts to other Countries

The U.S.S.R., whose own radio transmissions, like those of India, are necessarily multilingual, was also the first country to introduce broadcasts to other countries in their own tongues. Germany and Italy quickly followed. German broadcasts in English began in 1933. By the time the B.B.C. tentatively began its foreign language broadcasts in 1938, Italy was transmitting regularly in 18 languages; during the Second Great War the number broadcast regularly by the B.B.C. increased to between 40 and 50.

From the outset of the Second Great War all belligerents showed themselves acutely aware of the importance of broadcasting as a means of stimulating confidence at home, undermining the morale of opponents, and persuading neutral

states of the justice of their cause and the certainty of their victory. It was recognized as the readiest means of issuing public instructions at moments of emergency, *e.g.* during invasion or under bombardment. In Great Britain the Home Guard sprang into existence overnight as the result of a broadcast by Anthony Eden, May 14, 1940. The forces of the Free French rallied in response to a broadcast by Gen. de Gaulle, June 27, 1940. Churchill's radio speeches during the same summer produced a direct tonic effect on British people such as could have been achieved in no other way.

War-time Broadcasting

Attempts at jamming and interference had been expected and to some extent anticipated; but in the event they were relatively rare and usually half-hearted. Germany was content with imposing the death penalty for listening to broadcasts from other countries. Its own radio, being long geared to propaganda, was at first most skilfully directed against the morale of its opponents. German broadcasts to French soldiers during the winter of 1939-40 undoubtedly contributed to the disruption which led to the defeat of France.

In broadcasts to neutrals Germany lost ground by the overstatement of its case and too obvious distortion of the facts. By comparison British broadcasting was gradually able to achieve a world-wide reputation for honest statement which stood its cause, and later that of the Allies, in good stead.

British broadcasting also fulfilled a peculiarly important war-time function in providing a means whereby the people of German-occupied Europe could maintain contact with their own exiled governments and with the Allied cause. The B.B.C.'s own broadcasts to occupied Europe were not only a constant stimulus to courage and hope, but after 1941 became a direct incentive to resistance, a rallying-cry to all underground forces working against the Nazis.

As long as the effective range of television transmission remains limited, it is probable that the transmission of sound broadcasts to other countries will retain, for better or worse, its political importance, though the number of those who listen to such broadcasts may well decline. Otherwise it would seem that in the matter

of imparting information, instruction, and entertainment alike, the future, if not indeed the present, is with television—and the sociological results are even more incalculable.

Bibliography. The Story of Broadcasting, A. R. Burrows, 1924; Broadcasting, H. Matheson, 1933; Broadcasting and a Changing Civilization, E. H. Robinson, 1935; La Radiodiffusion, Puissance Mondiale, A. Huth, 1937; The Power Behind the Microphone, P. Eckersley, 1941; Radio Today, A. Huth, 1942; Voices in the Darkness, T. Lean, 1943; Radio Networks and the Federal Govt. (U.S.A.), T. B. Robinson, 1943; Radio Heute und Morgen, A. Huth, 1944.

BRITISH LAW RELATING TO BROADCASTING. No one may, with a few exceptions, use a wireless telegraphy station or apparatus without a licence from the postmaster-general and fees may be charged with certain exceptions—*e.g.* for reception, to a blind person. It is an offence to use any wireless telegraphy apparatus to receive messages which the person using the set is not authorised to receive—*e.g.* secret police messages.

With certain limitations the postmaster-general is compelled without fee to grant to a British subject an experimental licence for scientific research.

To check interference, there are an advisory committee and an appeal tribunal. The postmaster-general consults the advisory committee as to regulations to check interference by apparatus likely to cause it. When the postmaster-general considers that apparatus does not comply with the requirements of the regulations, he notifies the person in possession of the apparatus or its manufacturer or importer, prohibiting the use or sale of the apparatus. An appeal lies to an appeal tribunal. The use of any apparatus with the deliberate object of interfering is an offence.

By the Defamation Act, 1952, broadcasting of words (which includes pictures, visual images, gestures, and other methods of signifying meaning) by means of wireless telegraphy is treated as a publication in permanent form—*i.e.* as libel and not slander. This distinction is important, as frequently words which are actionable as libellous if in permanent form—*e.g.* written—would not be actionable as slanderous if merely spoken.

To use a radio or television in public, even if no charge is made—

e.g. in the public rooms of an hotel or in a public house bar—will, if there is broadcast any matter which is copyright matter, be an infringement of copyright if permission is not obtained from the owner of the copyright or his agent—*e.g.* the Performing Right Society and also possibly Phonographic Performance Ltd. when a gramophone record is broadcast.

As the result of a report, published in 1952, of a copyright committee set up by the board of Trade, and owing to the imminence of commercial television, a bill was introduced into parliament in 1955, and enacted in 1956, which conferred a new right called the television exhibiting right on the British Broadcasting Corporation or the Independent Television Authority. This prohibited anyone from exhibiting without permission any television broadcast (including any accompanying sounds), or any recording of it, in public. This new right was in addition to any copyright there might be in what was being televised, and indeed is of the greatest importance where what is being televised is in fact not protected by copyright—*e.g.* a television broadcast of a sports meeting or a game. This new right made it possible for the B.B.C. or programme contractors through the I.T.A. to prevent other persons from showing in public any television broadcast of a spectacle made by arrangement with the promoters.

It did not confer a similar right in respect of a broadcast of sounds only.

CONTROL IN OTHER COUNTRIES. The B.B.C. is a public corporation established by royal charter; it is not controlled by a government ministry. But in many other countries there is direct ministerial control of broadcasting. In Bulgaria the state radio is controlled by the council of ministers, in Czecho-Slovakia by the ministry of culture, in Burma by the ministry of information. There is also direct government control of broadcasting in Ceylon and China.

Australia uses two systems—the government-owned Australian Broadcasting Commission and the privately owned commercial stations. In South Africa, broadcasting is run by a public corporation responsible to the South African parliament and operating both commercial and non-commercial programmes. In the U.S.A. all but a few radio stations are privately owned and produce

commercially sponsored programmes. In South America, while some of the broadcasting stations are government run, most of them are privately owned and carry advertisements. Japan also has a dual system of broadcasting with privately owned commercial stations, and, running in parallel, the Japanese Broadcasting Corporation, a chartered public service organization. The degree of government control exercised over it has been the subject of public debate for some time. In the Federal German Republic broadcasting is conducted by seven regional corporate bodies free from state control. In the Netherlands the state owns the transmitters and the broadcasting time is shared by an association of five religious, cultural, and political organizations.

Broadcasting in the U.S.S.R. is directed by the ministry of education and the ministry of communications. There are also more than a hundred regional radio committees administering regional programmes in 70 languages. India has a state-owned radio directed by the ministry of information and broadcasting which provides its listening population at home with broadcasts in the 16 major vernacular languages.

While in countries like the U.S.A. and Sweden there are very few homes without a radio set, in India, Morocco, Albania, Yugoslavia, Jordan, Indonesia, Burma, and other Asian and African territories less than 10 p.c. of homes have one. In some countries a high proportion of listeners do not have ordinary valve radio sets but what is called "wired broadcasting" or "rediffusion," a form of set receiving via telephone lines a limited choice of radio programmes. In the Communist countries of central and eastern Europe, and in China, the proportion of homes with this type of equipment is increasing; they can receive only government-controlled programmes, nearly all nationally originated. In Switzerland and the Netherlands, where rediffusion is common, a choice of programmes originating from France, Belgium, Germany, Italy, and the B.B.C. is offered. The wired broadcasting service in Malta includes programmes from the U.S.A., Canada, Italy, and the B.B.C.; that in the West Indies programmes from the U.S.A., the Netherlands, Canada, and the B.B.C.

In the 1950s many countries introduced a better technical sys-

tem for national sound broadcasting, using transmitters that radiate on very high frequency (V.H.F.), *i.e.* on wavelengths which are shorter than those used for ordinary short wave, long-range broadcasting. They offer much clearer reception though they serve smaller primary areas. Very high frequency transmitters are used extensively in the U.S.A., Germany, Great Britain, and Italy, and, on a smaller scale, in France, Canada, the Netherlands, the U.S.S.R., some of the Latin American republics, Switzerland, Morocco, Finland, Israel, and other territories.

In the international sphere broadcasting is under the jurisdiction of the International Telecommunication Union, which has a consultative committee to deal with matters concerning radio. The I.T.U. allocates radio frequencies to the different users in order to prevent interference between the radio stations of different countries, and keeps a register of these allocations, which are not constant but vary according to the time of day and the season. Consult World Communications, published by U.N.E.S.C.O.; World Radio Handbook for Listeners, Copenhagen; Guide to Broadcasting Stations (Ilfie & Sons Ltd.).

Broadcloth. Fine woollen cloth; so called because it is woven very wide to allow for shrinkage. One type, woven from West of England woollen yarns in very wide widths, is shrunk during finishing by about 33 per cent. The term broadcloth is sometimes used for the fine cloth from which are made the suits worn by the clergy.

Broadhalfpenny Down. Locality of Hampshire, England, near the village of Hambledon, 10 m. N. of Portsmouth. Here c. 1750 originated cricket in a recognizably modern form. The Hambledon club had its birth at the Bat and Ball inn on the down. See Hambledon; Nyren.

Broad Law (O.E. *hlaw*, hill, mound). Mountain of Peeblesshire, Scotland. It is 12 m. S.W. of Peebles, and its alt. is 2,754 ft.

Broadmoor. State institution in Berkshire, England, for persons who would formerly have been classed as criminal lunatics. It is 2 m. from Wellington College railway station. Opened in 1863, it can accommodate 700 inmates.

Broads, THE. Low-lying district in the E. of England, mainly in Norfolk, but partly in Suffolk.



The Broads. Oulton Broad, on the Waveney, 2 miles from Lowestoft

It consists of a number of shallow meres connected by dykes with the rivers Yare, Bure, Waveney, Thurne, and Ant, and is navigable by small sailing boats and motor boats drawing up to 4 ft. The meres alternate with expansive reed marshes, the haunt of waterfowl. Among the principal broads are Wroxham, Salhouse, Horning, Barton, Oulton, Hoveton Great, Hoveton Little, Ranworth, Hickling, Filby, Rollesby, and Ormesby. The district, a popular resort, covers 5,000 acres. Consult *The Broads*, R. H. Mottram, 1952.

Broadsheet OR **BROADSIDE**. The earliest form of popular printed literature, generally a ballad or sensational narrative on a single sheet of paper. Though generally superseded by the chapbook in the 18th century, the broadsheet continued to be issued for Last Dying Speeches of executed malefactors well into the 19th century. Up to the 20th, popular songs were sold as broadsheets.

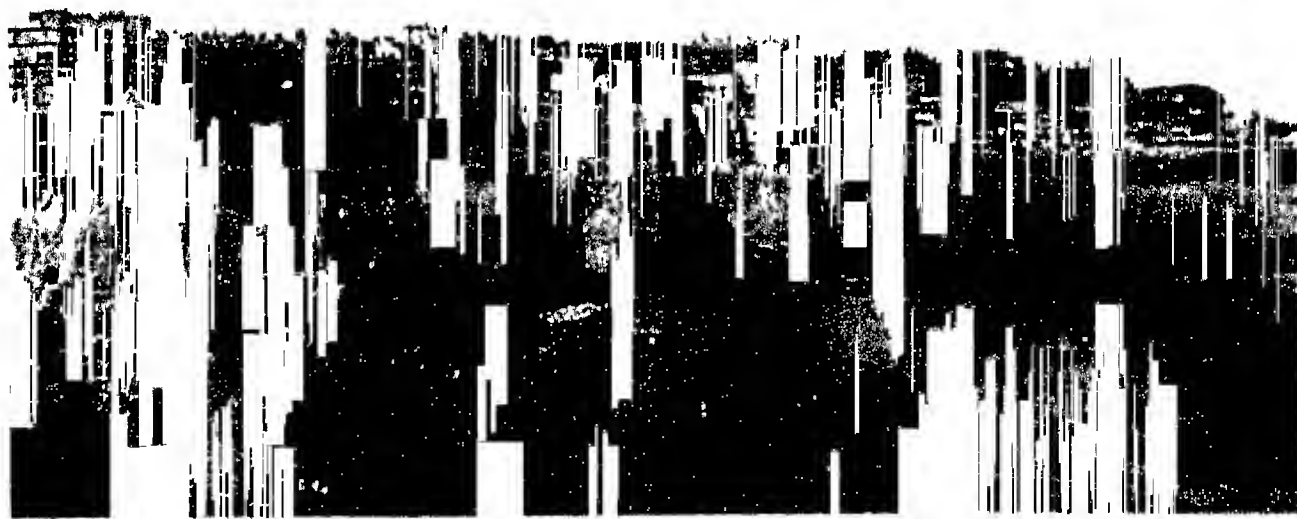
Broadside. Discharge by a warship of every gun that will bear upon or within a few points of the beam. In the days of sailing ships, when guns were ranged round the sides, only one half of the guns could be fired. The term "broadside ships" was applied to some early British ironclads of similar design to distinguish them from those in which the guns were otherwise disposed. Modern battleships have all their heavy guns mounted on the centre-line, and thus can concentrate their entire main armament on either beam.

The fighting power of warships was formerly compared on the basis of their broadside fire, i.e. the total weight of the projectiles fired in one round from each gun that bore on the beam discharged simultaneously. The salvo, the firing of alternate guns in turrets, is now in general use in preference to the broadside. See *Battleship: Guns and Gunnery*.

Broad Sound. Inlet of Central district, Queensland, Australia. Extending inland for about 55 m.

it has a maximum breadth of 25 m. and affords secure anchorage. There are extensive coal-beds in the neighbourhood.

Broadstairs AND **ST. PETER'S**. Urb. dist. and seaside resort in the Isle of Thanet, Kent, England, 2 m. N.E. of Ramsgate. It has a fishing-boat pier and bathing establishments, and exports filter-sand. It was immortalised by Dickens, who here made his summer residence 1837-51 at Fort House, popularly but erroneously identified with Bleak House (*q.v.*).



Broadstairs. Main bay of this popular East Kent seaside resort

The town was bombed in 1917, and on many occasions in the Second Great War. Pop. (1951) 15,082.

Broadsword. Sword with a broad blade, and one or both edges sharpened, primarily designed for inflicting heavy cutting blows. This type of weapon was the most common until about the 16th century, when the light Italian thrusting rapier began to displace it. The broadsword was provided with a point for thrusting from the 13th century, but was used mainly for cutting until the later date.

It was a favourite weapon of the swashbucklers and bullies of the Elizabethan period, and the English became more and more expert in its use as mail and similar defensive armour died out, while it was and is the national weapon of the Highland clans. Provided with one sharp edge and a point, it is represented today by

the sabre and claymore. The broadsword used in fencing is a modification of the 16th century thrusting rapier. See *Fencing*; *Sword*.

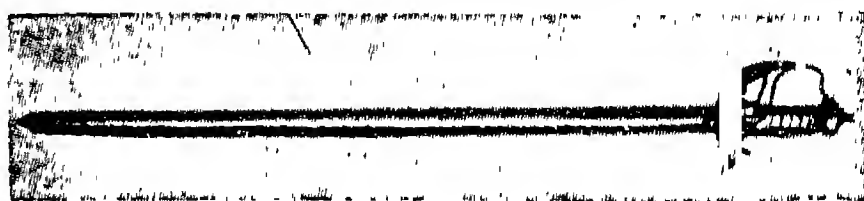
Broadway. Parish and village of Worcestershire, England. It is 5 m. to the S.E. of Evesham by railway, and is situated in the Cotswold Hills at the foot of Broadway, or Fish, Hill. There are 16th- and 17th-century stone houses, a building thought to have been the manor house of the abbots of Pershore, and a Tudor inn. Tudor Snowhill Manor, occupied by the National Trust in 1951, lies 3 m. S. Pop. (1951) 2,564.

Broadway. One of the principal streets of New York city. It runs northward the length of Manhattan I., diagonally across the "grid," becoming the continuation of 11th avenue at 106th street. The total length is 18 m. Between 34th and 59th streets it intersects New York's amusement centre, where its many lights have earned it the name of "the great white way." By day

Broadway is considerably less attractive. The street was named *breede weg* (broad way) by early Dutch settlers.

Broadwood, JOHN (1732-1812). Founder of a British firm of pianoforte makers. Born at Cockburnspath, Berwickshire, he came to London in 1761, and in 1770 entered into partnership with Tschudi, a Swiss manufacturer of harpsichords. In 1783 he took out his first patent for a new construction of the pianoforte. In the same year he became sole proprietor of the business, and in 1795 the firm of Broadwood and Sons was established.

Broddingnag. An imaginary country described in Swift's *Gulliver's Travels* as peopled by a race

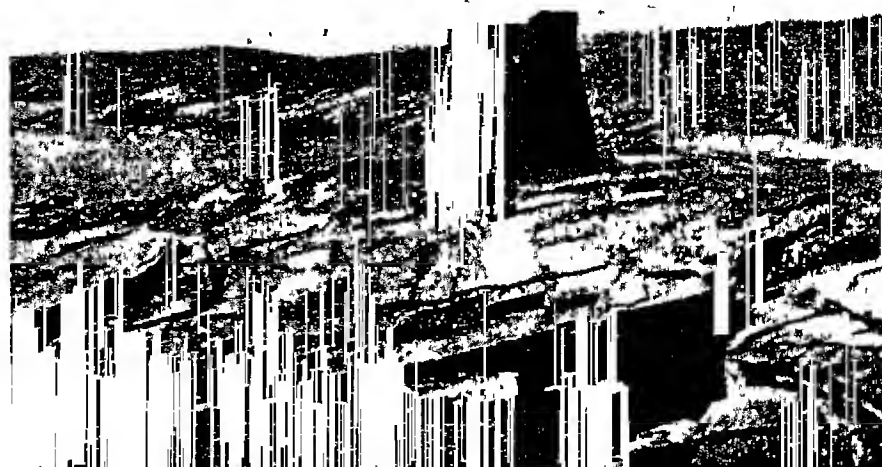


Broadsword used by Oliver Cromwell, 1649

of men as tall as a church spire. Hence the term brobdingnagian has come to be applied to anything of gigantic size. See Gulliver's Travels.

Broca, PAUL (1824-80). French anatomist and anthropologist. Born at Sainte-Foy-la-Grande, June 28, 1824, he became professor of surgical anatomy in Paris in 1849. Notwithstanding his researches on the brain—the seat of speech is called Broca's convolution—he is best known as a pioneer of modern anthropology. Founder and life-secretary of the Anthropological Society of Paris, and founder in 1872 of *La Revue d'Anthropologie*, he discussed the physical characters of prehistoric man, and established modern craniometry. He died in Paris, July 9, 1880.

Brocade (Span. *brocado*, embroidered). Term applied generally to fabrics richly wrought with a raised pattern, usually of silk and sometimes with gold and silver threads. In a true brocade the ornamentation is brocaded or broached on the ground fabric with floating threads, but stuffs with merely an appearance of such stitching are often called brocades. Brocade seems to have been first made by the Chinese, and to have found its way to Europe through the Saracens. In the 14th century Florence, Genoa, Venice, and other



Broch. One of these prehistoric round towers in the Shetlands

Italian towns, and, later, Lyons produced fine brocades. The art of making it was probably introduced into England by French refugees in 1685, and Spitalfields became famous for its brocade.

Broccoli. Biennial plant, *Brassica oleracea botrytis*, of the family Cruciferae, widely cultivated as a vegetable. It grows to 2 ft. in height. There are numerous varieties, of two main types: one with a large cauliflower-like head, the other (sprouting broccoli) producing numerous small white or purple flower-clusters each surrounded by small leaves. The flower-buds of both types are cut for use while they are still tightly compacted.

Seed is sown outdoors from early April to early May; first, varieties for autumn and winter use; next, those for early spring; last, those for May and June. The seedlings are transplanted 4 ins. apart each way, and in June and July about 20 ins. apart in rows 2 ft. apart. There is also a perennial broccoli with a small cauliflower-like central head and with up to nine smaller heads branching out around it. For all types, a really firm root-run in good soil is essential.

There is no structural difference between broccoli and cauliflower; but broccoli is the hardier and is not quite such tender eating.

Broch (Old Norse *borg*, stronghold). A type of Early Iron Age fort or tower found in the north of Scotland. It is a circular, tower-like structure, 30 to 40 ft. in diameter, with massive dry-stone walls 12 to 16 ft. thick, in which are rooms or cells opening on to a central courtyard. The courtyard was roofless, and often had a verandah round it. There was a single, narrow entrance with a guard-chamber. The broch usually stood with an encircling rampart and ditch. The greatest number of brochs are to be found around the coast in Caithness (where 145 are

known), Sutherland, Orkney, Shetland, and the western isles, but a few examples exist farther south, the southernmost being near Stirling and Galashiels and in Berwickshire. Typical examples are Keiss, Caithness; Mousa, Shetland; Dun Telve, Inverness; Dun Durnagil,

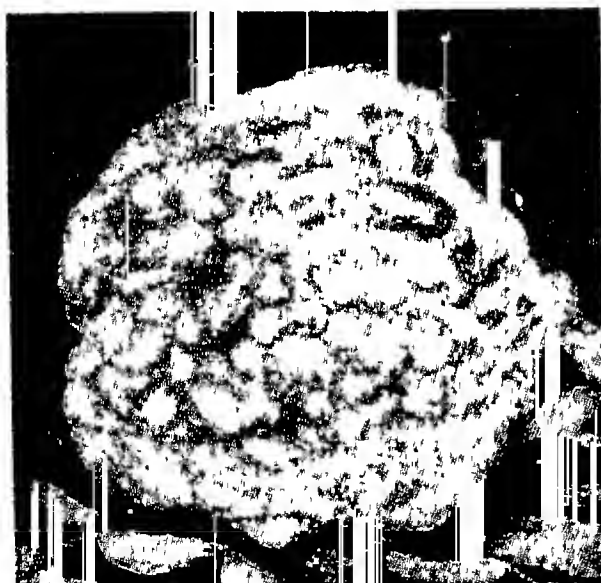
Sutherland; Dun Carloway, Lewis.

The brochs date from about the beginning of the Christian era, or a little earlier. Many continued in use until the 5th and 6th centuries. They reflect a period of unrest and coastal raiding, when local chiefs found it prudent to have castle-like buildings in which they could take refuge. The brochs have a superficial resemblance to the stone towers, *nuraghe*, of Sardinia, but the *nuraghe* were roofed and belong to an earlier period.

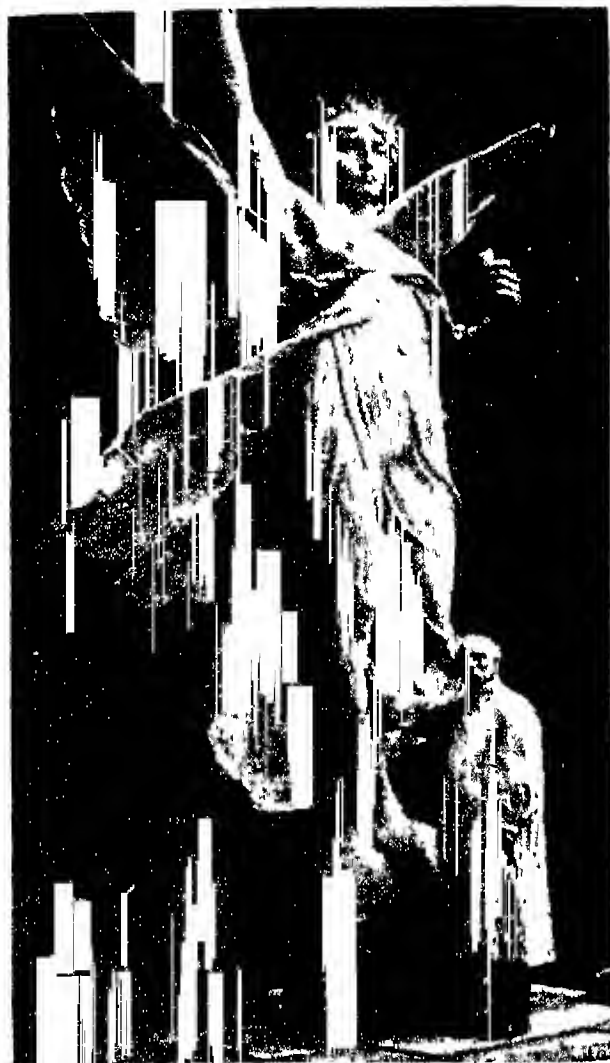
Brock, SIR ISAAC (1769-1812). British soldier. Born in Guernsey, Oct. 6, 1769, he entered the army and was sent to Canada in 1802. In 1810 he was put in command of the troops in Upper Canada, which he defended against the Americans in 1812. In August he defeated General Hull at Detroit, and was knighted, but on Oct. 13 he was killed at Queenston Heights, near Niagara. His services earned for him the title of "the hero of Upper Canada," and Brockville, Ontario, is named after him.

Brock, SIR OSMOND DE BEAUVOIR (1869-1947). British sailor. Son of a naval officer, he entered the navy in 1882. In 1904 he was made a captain, and in 1915 a rear-admiral. Meanwhile he had served as assistant director of naval mobilisation, and had obtained other experience of staff work. In the First Great War, he led the Princess Royal into action at the Dogger Bank and Jutland. In Nov., 1916, he was made chief of staff to the C.-in-C. (Beatty) of the grand fleet, and in 1919-21 was a lord of the admiralty. He was C.-in-C. Mediterranean, 1922-25, and Portsmouth, 1926-29. He died Oct. 14, 1947.

Brock, SIR THOMAS (1847-1922). English sculptor. Born at Worcester, he studied at the local school of art, and, coming to London in 1866, entered the R.A. schools. Later he became the pupil and assistant of J. H. Foley. His works include the bronze bust



Broccoli. Improved early purple sprouting broccoli. Above: Mammoth spring white broccoli



Sir Thomas Brock at work on the huge figure of Victory which surmounts the Queen Victoria Memorial, London

of Lord Leighton (1893) and the Leighton Monument in S. Paul's Cathedral (1900); the marble bust of Queen Victoria (1901) and the statues of that queen at Hove and Birmingham (1901); the Moment of Peril (1880) and the Eve (1900), both in the Tate Gallery. He was responsible for the designs for the coinage of 1893 and for the Queen Victoria Memorial in the Mall. Elected R.A. in 1891, knighted in 1911, he died Aug. 22, 1922.

Brocken OR BLOCKSBERG (anc. *Mons Bruclerus*). Mt. of central Germany, famous in legend. The highest point in the Harz Mts. (3,730 ft.), its bare summit is reached by a railway and by two carriage roads. In heathen times, and long after the introduction of Christianity, it was a place of worship where certain rites were celebrated on the eve of May 1. The "spectre" of the Brocken is an optical phenomenon, seen when the sun is on one side, mists are on the other, and the summit is free from clouds. In such circumstances the shadows of the mountain and the objects thereon are thrown in enormous size on to the wall of fog. In German legend the mt. is associated with the witches' festival of Walpurgis Night (*q.v.*).

Brockenhurst. A village of Hampshire, England. It is on the rly., lying between Southampton, to N.E., and Bourne-

mouth, to S.W., about 14 m. from each. Towards the S. edge of the New Forest, it is a centre for walking parties and visitors to the forest. The only industries concern timber and the forest ponies. Pop. (1951) 2,387.

Brockhurst, GERALD LESLIE (b. 1890). A British painter. Brockhurst was born in Birmingham and studied art at R.A. schools in London, winning the studentship given by the R.A. council in 1913, as well as other awards. Later he became a member of the committee of British Artists' Exhibitions, and in 1928 he was a member of the jury of the international exhibition at Venice, becoming A.R.A. in the same year. In 1937 Brockhurst was elected a member of the Royal Academy and was also a member of the Royal Society of Portrait Painters. A fine draughtsman, he represented the academic and traditional style. He went to the U.S.A. in 1939.

Brockram. Coarse limestone-bearing sedimentary breccia found in Cumberland and Westmorland. The word is a local synonym for breccia, both meaning broken. It consists of old scree and wash-out material of lower Permian age lying along the W. Pennine slope, especially in the vale of Eden between Appleby and Carlisle. The lower beds, about 100 ft. thick, mostly comprise Carboniferous limestone pebbles and fragments in a sandy matrix of reddish-brown colour. In higher horizons the contained rock-fragments were derived from beds of pre-Carboniferous age.

Brock's Benefit. Popular name for a display of fireworks made by Messrs. C. T. Brock and Co., held at the Crystal Palace (*q.v.*) at dusk on Thursdays in the late summer up to 1936. The performance lasted half an hour, followed a set pattern of rockets, star-shells, and ground pieces, and closed with a green light.

Brockton. City of Massachusetts, U.S.A., in Plymouth co. It is 20 m. S. of Boston, on the New York, New Haven & Hartford rly. Famous as a shoe-making centre, it also makes shoemakers' tools, wood and paper boxes, and food products, and has printing works. Settled in 1700, on land sold in 1649 by the Indians to Miles Standish and John Alden for £7,105, and originally called Bridgewater, it was incorporated as North Bridgewater 1821, changed its name to Brockton in 1874, and became a city 1881. Pop. (1950) 62,860.

Brockville. Town of Ontario, Canada. Capital of Leeds co., it is on the St. Lawrence river, 138 miles by rly. S.W. of Montreal. An important rly. junction, it is a port of call for the St. Lawrence steamers. It exports dairy products and manufactures agricultural implements, hardware, carriages, white lead, gloves, leather, chemicals, and machinery. It was named after Sir Isaac Brock (*q.v.*). Pop. (1951) 12,301.

Brockway, ARCHIBALD FENNER (b. 1888). British politician and publicist. He was born at Calcutta and educated at Eltham College, and served several terms of imprisonment as a conscientious objector to military service, 1917-18. Appointed general secretary of the Independent Labour party, he was Labour M.P. for East Leyton, 1929-31, contesting Cardiff as an I.L.P. candidate in 1942. He was editor of the New Leader, 1926-29 and 1931-46, and political secretary of the I.L.P., 1939-46. In 1947 he joined the Labour party, becoming M.P. for Eton and Slough, 1950. Among his numerous pub. works are *A New Way with Crime*, 1929; *Inside the Left*, 1942; *Death Pays a Dividend* (with F. Mullally), 1944.

Brockwell Park. London pleasure ground. It is in the borough of Lambeth between Herne Hill and Tulse Hill. Once the property of



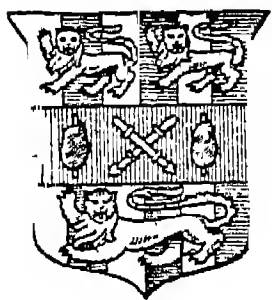
Brocken. On this high, bare summit of the Harz Mts. are a hotel, meteorological observatory, and observation tower

the Blades family, it was made over to the public in 1892.

Brod. Fortified town and district of Croatia, Yugoslavia. The twin towns of Bosanski-Brod and Slavonski-Brod are 145 m. W. of Belgrade and are situated on the banks of the river Sava, where the rly. crosses the river on the way to Serajevo in Bosnia. The inhabitants are a mixture of Serbs and Croats.

There is another Brod in Yugoslavia, 34 miles S. S.W. of Skoplje (Uskub).

Broderers' Company. London City livery company. It was incorporated in 1561, and its hall once stood in Gutter Lane, E.C., being known in the 19th century as Embroiderers' Hall. It now has no hall. The office is at 7, New Square, Lincoln's Inn, W.C.2.



Broderers' Company arms

Brodeur, LOUIS PHILIPPE (1862-1924). Canadian politician. Born at Belœil, Quebec, Aug. 21, 1862, he was educated at S. Hyacinthe college and Laval university, and in 1891 entered the dominion house of commons as a follower of Sir Wilfrid Laurier. In 1896 he was made deputy speaker and in 1900 speaker. In 1904 he became minister of inland revenue in the Liberal cabinet, and in 1906 he was transferred to the ministry of marine and fisheries. Responsible for the Naval Act of 1910 and the first head of Canada's navy, he did much to protect Canadian fisheries and navigation on the St. Lawrence. In 1911 Brodeur left office with his party and was made a judge of the supreme court of Canada. He died Jan. 2, 1924.

Brodick. Parish and village on the isle of Arran, Buteshire, Scotland. A favourite resort on Brodick Bay, it has a fine beach and a landing-pier. Near by is Brodick Castle, 19th-century, on the site of an older castle. Pop. (1951) 1,424.

Brodie, SIR BENJAMIN COLLINS (1783-1862). British surgeon. The son of a Wiltshire clergyman, he studied at S. George's Hosp., London. Having taken his degree, he was surgeon there from 1805 until his death, Oct. 21, 1862. Brodie attended George IV, 1820, and



Sir Benjamin Brodie, British surgeon

was surgeon to William IV, who made him a baronet in 1834, and to Queen Victoria. His collected works, including his Autobiography, were edited by C. Hawkins in 1865. His son, Sir Benjamin Collins Brodie (1817-80), the second baronet, was professor of chemistry at Oxford during 1865-80 and made important investigations into carbon and graphite.

Brodie, WILLIAM (d. 1788). Scottish criminal. Born in Edinburgh, the son of a cabinet-maker and town councillor, he succeeded to his father's business, and was a deacon councillor of Edinburgh. A gambler from boyhood, he became the leader of three accomplished burglars, whose robberies in 1787 were numerous and successful. The burglars remained undetected until March, 1788, when after a robbery at the excise office in Canongate, one of the trio turned king's evidence. Brodie escaped to Amsterdam, but was subsequently arrested and hanged in Edinburgh, Oct. 1, 1788. The play, *Deacon Brodie* (1879), by R. L. Stevenson and W. E. Henley, produced 1884 at Prince's Theatre, London, deals with him. *Consult* Trial of Deacon Brodie, ed. W. Roughead, 1906.



William Brodie, Scottish criminal
From an old engraving

Brodsky, ADOLPH (1851-1929). Russian musician. Born at Taganrog, Russia, March 21, 1851, he studied at the Vienna Conservatoire, and under Hellmesberger joined the court orchestra at Vienna. During 1870-80 he toured and conducted in Russia. He was chief professor at the Leipzig Conservatoire 1883-91, conductor of the Damrosch Symphony Orchestra, New York, 1891-94, and in 1895 was appointed principal of the Royal Manchester College of Music in succession to Sir Charles Hallé. He died Jan. 22, 1929.

Brody. Town of Ukraine S.S.R. 40 m. N.W. of Tarnopol. It lies in the area ceded by Poland to Russia, 1945. It trades in grain, wool, and farm implements. In the First Great War Brody was captured on July 30, 1916, by the Russians under Sakharov, who took 40,000 prisoners; but it was reoccupied by Austro-Hungarian troops, Feb. 13, 1918. Pop. 17,750.

Brodzinski, CASIMIR (1791-1835). Polish poet. Born at Krotowka, Galicia, March 8, 1791, he

joined the French army in 1809, fought in the Russian campaign of 1812-13, and was taken prisoner at the battle of Leipzig. Professor at the university of Warsaw for some years before it was closed in 1831, he is chiefly memorable as the precursor of the national poet, Mickiewicz. His poem, *Wieslaw*, 1820, presents in idyllic fashion the peasant life of the country about Cracow. He died at Dresden, Oct. 10, 1835.

Brogan, DENIS WILLIAM (b. 1900). British political scientist and publicist. Born at Glasgow Aug. 11, 1900, he was educated at Glasgow University, Balliol College, Oxford, and Harvard. He was lecturer at University College, London, the London School of Economics, and Corpus Christi College, Oxford, and was appointed professor of political science in Cambridge, 1939. Regarded in both the U.K. and the U.S.A. as an authority on American affairs, he excelled in quiz programmes broadcast by the B.B.C. Brogan's publications include *The Development of Modern France*, 1940; *Politics and Law in the United States*, 1941; *the American Problem*, 1944; *Roosevelt and the New Deal*, 1952; *An Introduction to American Politics*, 1955.

Bröggerite. A variety of pitchblende or uraninite, named after W. C. Brögger, found at Anneröd, Norway. Bröggerite contains about 80 p.c. uranium oxide, with thorium and lead.

Broglie. French family of Piedmontese origin. The family came to France in 1643, its first representative, François Marie (d. 1656), bearing the title of comte.

His grandson, François Marie (1671-1745), created duc de Broglie in 1742, fought in the war of the Spanish Succession, and in 1724, when French ambassador in London, concluded an alliance between England, France, and Prussia. During the campaign in Italy in 1734 he distinguished himself at the battle of Parma, and again in 1741, when besieged in Prague by the Archduke Charles. Later, having failed as a commander in Bavaria, he was exiled to his estates, dying May 22, 1745.

His son and successor, Victor François (1718-1804), served at the battles of Parma and Guastalla in 1734, at the taking of Prague in 1742, and distinguished himself as a general in the Seven Years' War. For a time in 1792 he commanded a royalist army against the Revolution, and after serving under the Russian government died at

Münster. His brother, Charles François, comte de Broglie (1719-81), served in the army and subsequently became the most efficient member of the private diplomatic service of Louis XV.

Victor Claude, prince de Broglie (1757-94), son of Victor François, was elected to the States-General in 1789, became a member of the Constituent Assembly, and served with the republican army on the Rhine. He was condemned to death by the revolutionary tribunal and guillotined in Paris June 27, 1794. His brother, Maurice Jean Madeleine (1766-1821), escaped to Berlin during the Revolution, became almoner to Napoleon in 1803, and in 1807 was made bishop of Ghent. He was subsequently imprisoned by Napoleon, 1811, and on his return to Belgium, 1816, refusing to take the oath of allegiance to William I, a Protestant and the first king of the Netherlands, he was deported, and died in Paris. *Pron.* Brō-lyee.

Broglie, ACHILLE CHARLES LÉONCE VICTOR, DUC DE (1785-1870). French statesman. Son of



Duc de Broglie,
French statesman

Victor Claude, prince de Broglie, he became a member of Napoleon's council of state in 1809. He married the essayist Albertine Ida Gustavine (1797-1838), daughter of Mme. de Staël. During the reign of Louis Philippe he was for a short time minister of public worship and education, and as foreign minister in 1832 brought about an alliance with England. Opposed alike to the ambitions of Napoleon III and the socialism which brought about the revolution of 1848, in 1851 Broglie turned from politics to literature. He died Jan. 25, 1870.

His son and successor, Jacques Victor Albert (1821-1901), began his literary career as contributor to the *Revue des Deux Mondes* and *Le Correspondant*. His book, *L'Église et l'Empire Romain au I^{ve} siècle*, 1856-66, won him entry to the Academy in 1862. In 1871, a year after succeeding to his father's title, he was elected to the National Assembly and became leader of the opposition to the Republicans. Made prime minister in 1873, he held office for a year, and was again prime minister in 1877. Distrusted by

Legitimists and Bonapartists alike, he soon retired from politics. He died Jan. 19, 1901.

Broglie, LOUIS, PRINCE DE (b. 1892). French scientist. A member of the famous French family and a younger brother of the 6th duc, he was born at Dieppe, Aug. 15, 1892. He studied in Paris and gained a reputation as a brilliant physicist. He developed the hypothesis of wave mechanics incorporated in the theories of Einstein, Planck, and Bohr, receiving the Nobel prize for physics in 1929. In 1928 he was appointed professor of theoretical physics at the Institut Poincaré of Paris university, and was made a member of the Académie des Sciences in 1935. De Broglie's book on wave mechanics was published in 1930 under the title of *Introduction à l'Étude de la Mécanique Ondulatoire*.

Broglie, MAURICE, DUC DE (b. 1875). French physicist. He was born in Paris April 27, 1875, and was a naval officer until his scientific interests caused him to leave the service. As a physicist he specialised in research work in connexion with X-rays and atomic physics. An honorary doctor of science of Oxford and of Leeds, de Broglie became a member of the Académie des Sciences in 1924 and was elected to the French Academy in 1934.

Brogue. Full-flavoured dialect, particularly the intonation used by the Irish in speaking English; also a trick, as in Robert Burns's Address to the De'il: "And played on man a cursed brogue." From Irish *barrōg*, a grip, a band (on the tongue), the word originally indicated an inability to pronounce exactly—hence a dialect.

Brogue (Gaelic *brog*, shoe) is the name given to the primitive rawhide shoe worn in parts of Ireland and Scotland, and hence to a modern type of strong leather shoe for country wear.

Broke. Former British destroyer of the Dover Patrol. Her displacement was 1,850 tons, her engines of 27,000 h.p. developed the high speed of 31 knots, and she carried an armament of six 4-in. and two machine-guns and four tubes for 21-in. torpedoes. Under Capt. E. R. G. R. Evans, later Lord Mountevans (*q.v.*), the Arctic explorer, in company with the *Swift*, she fought an action with six German destroyers, April 20, 1917 off the Belgian coast, in complete darkness. She sank one by ramming it, and a fierce hand-to-hand battle took place on the

Broke's decks. In 1920 she was purchased by the government of Chile. *Consult* Keeping the Seas, E. R. G. R. Evans, 1920.

The name was given to another British destroyer completed in 1920, lost while forcing the boom at Algiers, Nov. 8, 1942.

Broke; SIR PHILIP BOWES VERE (1776-1841). A British admiral. Born at Broke Hall, Suffolk, Sept. 9, 1776, and educated at the Royal Naval Academy, Portsmouth, he joined the navy in 1792. In 1806 he was made captain of the *Shannon*, and on June 1, 1813, during the war with the U.S.A., he captured the *Chesapeake* off Boston. Badly wounded in the action, he was compelled to retire from active service and was made a baronet. He died Jan. 2, 1841.

Broken Hill. City of New South Wales, Australia, 699 m. W. by N. of Sydney. It lies in a sheep-rearing area also containing tin, lead, zinc, and silver, and first explored by Capt. Sturt in 1844. Broken Hill became a city in 1888. Port Pirie in S. Australia handles most of its imports and exports, and smelts large quantities of lead concentrate from here; its zinc concentrate is shipped to Risdon, near Hobart, Tasmania. Pop. (1954) 31,355.

Broken Hill. Town of Northern Rhodesia, an important mining centre, 90 m. N.N.E. of Lusaka. It has an airfield, a govt. hospital (opened 1952), and two schools. Lead, vanadium, and zinc are produced at the Broken Hill mine where was discovered the skull of *Homo Rhodesiensis*, 1921; hydroelectric power is available. Soap and motor bodies are made. European pop. (1951) 3,326.

Broker. Word meaning an agent, but generally used in a more special sense for one who buys or sells on behalf of another. He must act according to the instructions given to him, and as a general rule his task is finished when he has made the contract between buyer and seller. Brokers are remunerated by commission, called brokerage; usually this takes the form of a percentage on the price of the goods bought or sold. The difference between a broker and a factor is that a broker does not take possession of the goods. Types of brokers are stockbrokers, wool brokers, produce brokers, bill brokers, and insurance brokers. The word is also applied to a dealer in second-hand furniture and to one who values goods when they are seized for debt. The pawn-

broker is a principal, not an agent. Broker meant originally one who broached or opened an article; later a retailer or middleman.

Bromberg. German name of the Polish town Bydgoszcz (*q.v.*).

Brome. A genus of grasses, most of them annuals, of the family Gramineae. There are about 50 species, found chiefly in temperate regions. The British species are generally considered as weeds, and *B. mollis* is listed as one of the five injurious weeds under the Seeds Act, 1920.

Brome, RICHARD (d. 1652). English dramatist. He was the



Richard Brome,
English dramatist
After an old engraving

servant and the friend of Ben Jonson, and lived on friendly terms with Fletcher, Dekker, Ford, and Shirley. His best work is in the pathetic drama of *The Northern Lass*, 1632, and the comedies *The Jovial Crew*, *The Court Beggar*, and *The Antipodes*.

Bromeliaceae. Extensive family of monocotyledonous plants, native to S. America and the West Indies. Some are terrestrial plants, but most are epiphytes, growing on the surface of other plants or trees. They are very short-stemmed or stemless, the long, stiff, channelled leaves, usually with spiny edges, fitting closely together so that the plant forms a kind of funnel. The showy flowers consist of three outer and three inner segments, with six stamens. One genus, *Ananas*, includes the pineapple.

Bromethol. Tribromoethyl alcohol, $C_2H_5OBr_3$. Compound introduced in 1926 under the name of avertin for use as a general anaesthetic. It is used as a basal narcotic followed by a supplemental anaesthetic.

Bromfield, LOUIS (1896–1956). American author. He was born at Mansfield, Ohio, U.S.A., Dec. 27, 1896, and was educated at Columbia and Cornell universities. His novel *The Strange Case of Miss Annie Spragg*, 1928, established his reputation as a writer of high dramatic



Louis Bromfield,
American author

power. His other novels included *Twenty-four Hours*, 1930; *The Rains Came*, 1938; *Night in Bombay*, 1940; *Until the Day Break*, 1942; *Mrs. Parkington*, 1943; *What Became of Anna Bolton*, 1944; *Pleasant Valley*, 1944. He also wrote many short stories. He died at Colombo, Ohio, March 19, 1956.

Bromides (Gr. *brōmos*, stink). Salts of hydrobromic acid, and the name given to compounds of bromine (*v.i.*) with other elements, except oxygen, fluorine, and chlorine. Metals such as iron and zinc dissolve in hydrobromic acid with the formation of bromides. Alkali bromides are obtained directly from bromine and caustic alkali, or technically from iron bromide as a by-product of the preparation of bromine. Nearly all bromides are soluble in water.

The bromides of sodium, potassium, and ammonium are used in medicine as a depressant of the higher centres of the brain, causing calmness and apathy. They have been used to reduce excitement, which prevents sleep, also to diminish the frequency of epileptic fits, but have been superseded in this field by more effective drugs.

Prolonged dosage with bromides produces a great cumulative effect, resulting in chronic poisoning (bromism) with symptoms of depression, stupidity, muscular weakness, gastric distress, and various forms of skin rash. The treatment of bromism is cessation of the drug and the increase of chloride intake into the body.

Silver bromide ($AgBr$) is a salt sensitive to light, and is used in the manufacture of photographic films, plates, and papers.

Bromide paper for printing photographs from negatives is coated with an emulsion of silver bromide in gelatin. This coating is very similar to that on films and plates used for the making of negatives in the camera. Its sensitiveness to light is such that exposure of the paper through a negative for a few seconds to an electric lamp suffices to impress the picture. The impression is invisible and requires to be developed, either with amidol in admixture with sulphite of soda, or with metol and hydroquinone with sulphite and carbonate of soda. Development is done in orange light and occupies from $\frac{1}{2}$ min. to 2 mins., when the picture is ready for fixing in hypo solution.

Chloro-bromide papers are coated with a mixture of silver chloride and silver bromide. They are

slower than bromide papers, but yield tones from warm black to rich brown by direct development.

Bromine. Chemical element, non-metallic, symbol Br, atomic number 35. It is a very dark red (almost black) liquid at ordinary temperatures, giving off dense choking fumes, and is one of the series of elements called halides, which contains also fluorine, chlorine, and iodine. Bromine is chemically very reactive, and rapidly attacks metals and organic materials; both the liquid and the vapour burn the skin.

The element was first isolated in 1826 by Balard, from the salt residues at Montpellier. These residues, called bittern, are rich in magnesium bromide, $MgBr_2$, and when treated with chlorine or heated with manganese dioxide and sulphuric acid release bromine. Most of the bromine of commerce comes from springs in Ohio and in Germany which are rich in magnesium bromide, or from the residues of the Strassfurt potash deposits. Other sources are the brine of the Dead Sea and ordinary sea water. On account of their high solubility the bromides collect in the mother liquors, from which they are released by treatment with chlorine, which displaces the bromine. The bromine is driven off by steam and collected by condensation; the last traces are recovered by passing the gases over moist iron filings, to form iron bromide.

Bromine has an atomic weight of 79.92; density 3.110 gm. per cm^3 at $0^\circ C.$; m.p. $7.3^\circ C.$; b.p. $58.80^\circ C.$ The liquid is only very slightly soluble in water, but dissolves readily in organic liquids such as benzene, chloroform, and carbon disulphide. It is monovalent. With hydrogen, in the presence of hot platinum, it gives hydrogen bromide, HBr , a solution of which in water is hydrobromic acid. This is a strong acid which with metals, or with their oxides, hydroxides, or carbonates, gives salts called bromides.

Bromine is dissolved by cold sodium hydroxide, to give unstable sodium hypobromite, $NaOBr$, an oxidising and bleaching agent. The most important organic compound is ethylene dibromide, $C_2H_4Br_2$, which is added to fuels for internal combustion engines: when lead tetraethyl is used as an anti-knock, the lead tends to deposit in the cylinders; with the addition of ethylene dibromide to the fuel the lead is removed as a volatile lead bromide.

Bromley. Borough and market town of Kent, England. It is 11 m. S.E. of London, of which it is a pleasant residential suburb, with many gardens and open spaces. The parish church of S. Peter & S. Paul, which contained the tombs of Francis Atterbury, bishop of Rochester, and of Dr. Johnson's wife, was demolished, except for the tower, by German bombs in 1941; Princess (later Queen) Elizabeth in 1949 laid the foundation stone of a new church consecrated in 1952.

Bromley Palace, once a home of the bishops of Rochester, is occupied by a teachers' training college. The chalybeate spring of S. Blaise (now a trickle) attracted pilgrims. Bromley College, founded in 1666, is a residence for 40 widows of Church of England clergymen. Bromley forms a bor. constituency. Market day, Thurs. Pop. (1951) 64,179. H. G. Wells was a native.

At Hayes Place, 2 m. S. (now demolished), Lord Chatham died and William Pitt the Younger was born. Included in the borough are the districts of Hayes and Keston, with their commons, Bickley, Sundridge Park, and Elmstead Woods. The Ravensbourne, rising on Keston Common, flows through it.

Another Bromley is a district in the metropolitan borough of Poplar, London. With Bow, it formed until 1950 the Bow and Bromley div. of the parl. bor. of Poplar. George Lansbury was M.P. for Bow and Bromley 1910-12 and 1922-40.

Bromoform (CHBr_3). Heavy liquid with an ethereal odour and a sweetish taste. It was discovered by Löwig in 1832, but its true composition was ascertained by Dumas. It is prepared by the action of bromine and caustic potash on alcohol or acetone. In many of its characteristics it resembles chloroform. It was formerly used as an antispasmodic in whooping cough, and as a general anaesthetic.

Bromoil. Process or method of making photographs. An ordinary print on bromide paper is bleached in a special tanning and bleaching bath. After further treatment, the picture is produced by "inking up" the surface with a special bromoil ink, using a bromoil brush. Various artistic effects can be obtained with this process, but a degree of skill is required.

Brompton Hospital. London institution for the treatment of tuberculosis and diseases of the chest, including cardiac surgery. The first site of the hospital, in 1841, was the Manor House, Chel-

sea. The premises in Fulham Road were constructed during 1844-79. A sanatorium and convalescent home near Frimley, Surrey, was opened in 1904 in connexion with the hospital; occupying an elevated but well-sheltered position in the neighbourhood of pine woods, it is admirably situated for the treatment of patients suffering from chest diseases.

Brompton Oratory. Roman Catholic church, Brompton, London, S.W., opened in 1884 and completed in 1897. It is so named because it is served by priests of the Institute of Oratory of S. Philip Neri. The Institute, established by Cardinal Newman in 1849 at a building in the Strand, London, moved to Brompton in 1854, F. W. Faber being the first superior there. The church is in the Italian Renaissance style, from designs by H. Gribble. Within are statues of the apostles by Mazzotti from Siena, an altar from Brescia in the Lady chapel, one from Maasticht in the chapel of S. Wilfred, and a replica of Maderno's figure of S. Cecilia. Facing Brompton Road is a statue of Cardinal Newman.

Brömsebro. Village and castle of S.E. Sweden, 29 m. S. of Kalmar. Here was signed in 1645 the treaty between Denmark and Sweden called the peace of Brömsebro, by which Denmark ceded Halland, Gothland, and two provinces of Norway to Sweden.

Bromsgrove. Urban dist. and market town of Worcestershire, England, giving its name to a co. constituency. It is half-way between Worcester and Birmingham, 13 m. from each. It has a Gothic church, an ancient inn, and markets for the sale of cattle and

farm produce. A horse fair is held annually in June. Bromsgrove was formerly the centre of the nail-making industry. Nuts and bolts, dies and tools, brushes, and fishing tackle are among the manufactures, and it is the site of one of the largest forging plants in Europe. Bromsgrove School, a Tudor foundation, has affiliations with Worcester College, Oxford; A. E. and Laurence Housman were pupils here. Market days, Tues. and Fri. Pop. (1951) 27,918.

Bronchiectasis (Gr. *bronchos*, windpipe; *ektasis*, extension). A chronic inflammatory disease of the bronchi in which the bronchi are dilated (this dilation being the least important feature), with impaired bronchial drainage of tenacious purulent secretion. The disease usually starts in childhood as an acute respiratory infection, especially in poorly nourished children. It follows acute infectious diseases, of which whooping cough is the commonest. The condition may present itself in many ways: as a chronic cough with thick yellow-green sputum with unhealthy sickly taint or offensive and putrid; with repeated haemorrhage from the lung; as repeated febrile illnesses.

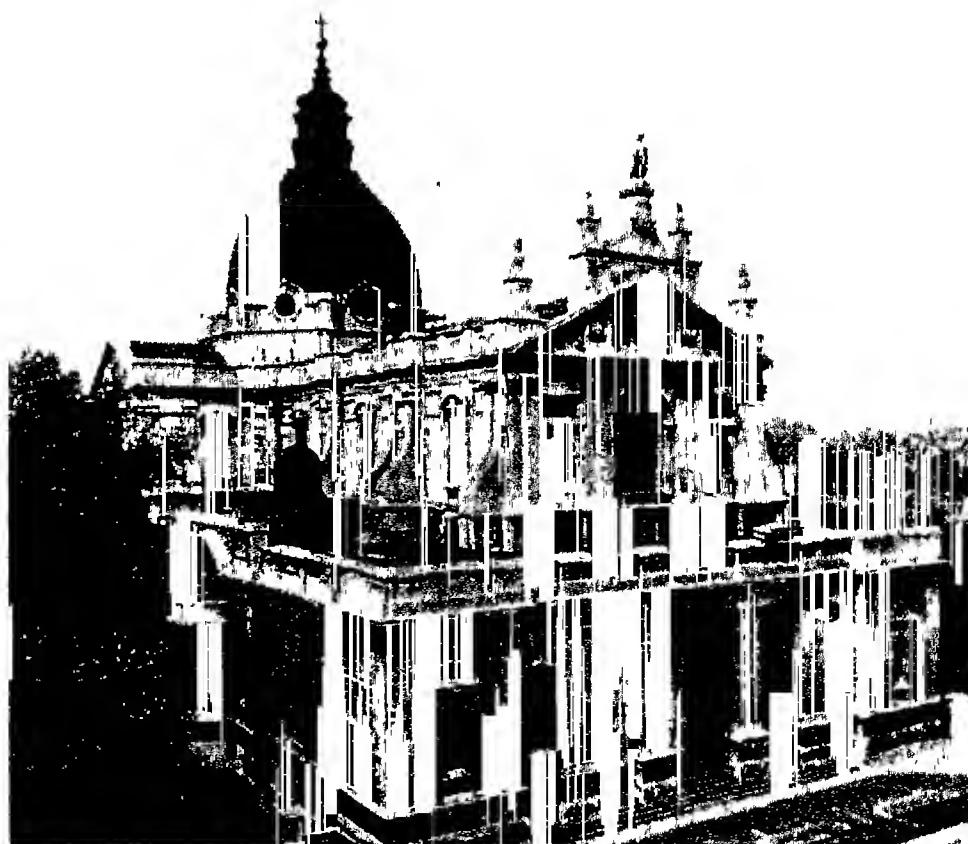
The physical signs vary very much, depending on the severity of the infection, the amount of lung tissue involved, and the degree of nasal sinus involvement.

The disease is best prevented by proper feeding. Good nursing and maintenance of chest wall movements during acute illnesses are most important. When the disease is established postural drainage, breathing exercises, and treatment of nasal infection, when present, are necessary. Natural

and artificial sunlight and penicillin are helpful. Where other measures have failed, surgical treatment may be indicated.

Bronchitis.

Acute or chronic inflammation of the bronchial mucous membrane. Acute bronchitis may occur at any age, but is most common in the very young and in the old. Damp, changeable weather increases liability to the



Brompton Oratory. Roman Catholic basilica in Brompton Road, London, associated with Cardinal Newman

disease. The disease is much more frequent in towns than in rural districts, particularly industrial towns where the air is laden with smoke. Mortality from bronchitis among infants under one year of age is sometimes two or three times as high in the large industrial towns of Lancashire as it is in the rural districts of the south of England.

The symptoms usually begin as those of an ordinary cold, and are followed by a rise in temperature, feeling of rawness or tightness in the chest, and severe cough, at first dry, and later accompanied by abundant expectoration. In healthy adults the symptoms generally abate at the end of a week; in infants there is serious risk of the condition extending to the lungs, and death occurring from bronchopneumonia. Measles and whooping cough much increase the liability to bronchitis, and nearly all the deaths from these diseases are due to the supervention of bronchitis or pneumonia.

Chronic bronchitis may follow repeated attacks of acute bronchitis or may accompany heart disease, Bright's disease, or gout. The condition is most common among the old, and may recur regularly every year with the approach of winter. The general health is often good, and the disease is not serious until in the later stages it is accompanied by extensive changes in the lungs and heart. Elderly people are likely to escape attacks by passing the winter in sunny climates such as those of Egypt, the Riviera, and the S. coast of England.

Brondesbury. Residential district of Greater London, within the bor. of Willesden, Middlesex. It is served by suburban electric railways.

Brongniart, ALEXANDRE (1770–1847). French scientist. Born in Paris, Feb. 5, 1770, he was professor of natural history at the Collège des Quatre Nations, 1797; director of the Sèvres porcelain factory, 1800, and professor of mineralogy at the Museum of Natural History at Paris, 1822. His chief writings are concerned with geology, the classification of reptiles, and the art of painting on glass. He died in Paris, Oct. 7, 1847. His son, Adolphe Théodore Brongniart (1801–76), was a well-known botanist.

Bronkhorst Spruit. Agricultural centre of the Transvaal, S. Africa, 30 m. E. of Pretoria and 4,680 ft. a.s.l. It was the scene of the opening event of the war of 1880–81 when, before war had been declared, 270 British soldiers were ambushed by Boers; only 20 escaped.

Bronte. Town of Sicily, in the prov. of Catania. It stands on the W. slope of Mt. Etna, 34 m. by rly. N.W. of Catania; alt. 2,600 ft. The neighbourhood is fertile and produces good wine. It was founded by Charles V, and, together with the monastic estate of Maniacium,

was granted by Ferdinand IV of Naples as a dukedom to Nelson in 1799. During the Second Great War, Bronte was occupied by the British 8th army, Aug. 8, 1943; its capture cut the main Axis defence line in Sicily and led to a German retreat. Pop. (1951) 20,857.

THE BRONTËS: A LITERARY FAMILY

Mrs. Ellis H. Chadwick, Author of *In the Footsteps of the Brontës*

Below is described the life-story of the three sisters, Charlotte, Emily, and Anne, the first named the author of Jane Eyre; the second, the author of Wuthering Heights, and all three poets. To the biographical details is added a brief estimate of the value of the works of the three. See English Literature; Novel

The three sisters, Charlotte, Emily Jane, and Anne Brontë, were all born at Thornton, now part of Bradford, in the W. Riding of Yorkshire. Their father, Patrick Brontë (1777–1861), a native of co. Down, Ireland, and a poor hand-loom weaver, became a teacher, and in 1802 entered S. John's College, Cambridge. He took Holy Orders, and, after holding various curacies, was appointed in 1820 to the incumbency of Haworth, which he retained until his death. His wife was Maria Branwell (1783–1821), a Cornish woman of Penzance, and this Celtic strain partly accounts for the strange, passionate novels which the Brontë sisters wrote.

Of the six children of the marriage, the eldest, Maria, and the second daughter, Elizabeth, died in 1825 at the age of eleven and ten respectively. All the remaining children—Charlotte, born April 21, 1816, Patrick Branwell, June 26, 1817, Emily Jane, July 30, 1818, and Anne, Jan. 17, 1820—became writers of poetry and prose, though nothing the brother wrote was published during his lifetime. The mother died of cancer in 1821, leaving the six children to the care of her sister, Elizabeth Branwell (1785–1842), who took charge of the home in 1822 until her death in 1842.

Earliest Literary Efforts

In 1824 the two elder daughters, Maria and Elizabeth, were sent to the Clergy Daughters' School at Cowand Bridge, Kirkby Lonsdale, and in the following year Charlotte and Emily became pupils, but, owing to the epidemic of influenza in the spring, the two elder girls returned home and died. Charlotte and Emily then left the school. From 1825–31 the four surviving children were educated at home by their father, who encouraged them to keep records of what they did, and to vie with each other in writing little imaginative stories. Many of these tiny MSS. are extant. In 1831 Char-

lotte, then fifteen, was sent to Miss Wooler's school at Roe Head, Mirfield. Although backward in some subjects, she was much in advance of the other pupils in drawing, literature, and history. At Roe Head she met Ellen Nussey (1817–97) and Mary Taylor (1817–93), the two friends who lent letters and supplied much of the material for Mrs. Gaskell's *Life of Charlotte Brontë*. After eighteen months as pupil, Charlotte returned home to teach her sisters and brother, but by 1835 she was back at school as a teacher, taking Emily with her as pupil. Emily stayed only three months, and for a little while Anne took her place.

The Sisters Support the Home

In 1836 Emily went as governess to a school at Southowram, near Halifax. Branwell, considered by his father and sisters the most gifted member of the family, failed to pass the entrance examination of the Royal Academy in 1835, although he and Charlotte had had lessons from William Robinson, a well-qualified artist in Leeds. In 1838 Charlotte left Roe Head, and in 1839 went as governess in the family of Mrs. John Sidgwick, at Stonegappe, Lothersdale. She stayed only three months, and, after being two years at home, took a situation as nursery governess at Mrs. John White's, Rawdon. In the meantime, Anne, the youngest sister, became governess to Mrs. Ingham's children at Mirfield, and later at the Rev. Edmund Robinson's, Little Ouseburn. Although teaching was distasteful to the Brontës, it was the only means of helping to support the home. Branwell tried portrait painting, and set up a studio in Fountain Street, Bradford, in 1838; but it proved unremunerative, and he had to turn to teaching. He held two appointments, and then became a railway clerk, ultimately going as tutor in the same house as his youngest sister at Little Ouseburn, from which post he was dismissed in 1845.



1. Haworth Church. 2. Mrs. Brontë, as a girl. 3. The Hall, Haworth. 4. Charlotte Brontë, from a portrait by G. Richmond. 5. Anne, Emily, and Charlotte, from a painting by their brother. 6. The Rev. Patrick Brontë, 1856. 7. House at Thornton, Bradford, where the sisters were born. 8. Main St., Haworth. 9. The parsonage, Haworth. 10. Charlotte's tomb in Haworth church. 11. Roe Head, Charlotte's school. 12. Brontë waterfalls, Haworth Moor

THE BRONTËS: HOMES, HAUNTS, AND FAMILY PORTRAITS OF THREE FAMOUS SISTERS

The aim of the sisters was to establish a school, and in order to increase their qualifications, Charlotte and Emily went to Brussels in 1842 to learn German and French at the Heger Pensionnat in the Rue d'Isabelle. After nine months abroad they were summoned home on the death of their aunt. Emily decided not to return to Belgium, but Charlotte eagerly availed herself of the offer of Prof. and Madame Heger to return as English mistress in January, 1843, remaining until New Year's day, 1844. Both Charlotte and Emily had made rapid progress in their studies while in Brussels, and they were greatly influenced by the kindness of Prof. Heger.

Charlotte Brontë's Novels

In 1843, when Charlotte was in Brussels, she experienced the passion of her life, which coloured her three novels, *Jane Eyre*, *Shirley*, and *Villette*, and many of her poems. Prof. Heger was the hero of these novels. His wife lives in *Villette* as Madame Beck, the spying mistress of the Belgian school. Most of Charlotte Brontë's characters have been easily identified. Charlotte left Brussels very reluctantly, and after her return in 1844 she wrote the now famous letters to Prof. Heger, published in *The Times*, July 29, 1913, which help to prove her devotion to her "only master in literature."

By the autumn of 1845 all the sisters were at home, and, after an unsuccessful attempt to start a school at Haworth, they turned to their poems, which had been written secretly at different times. Charlotte compiled a small book from the selected MSS., which was published under the names of Currer, Ellis, and Acton Bell. The book was published in 1846, but only two copies were sold. Nothing daunted, the sisters decided to try prose, and sent three separate novels the round of the publishers. Charlotte's was *The Professor* (published in 1857, after her death); Emily produced *Wuthering Heights*; and Anne, *Agnes Grey*. The MSS. of Emily and Anne were accepted, but Charlotte's was rejected. She then quickly wrote *Jane Eyre*, which was published before her sisters' novels. *Jane Eyre* was the sensation of the literary world in 1847, and the author took her place immediately in the front rank of novelists. Charlotte's second novel, *Shirley*, a weaker but pleasanter work, was interrupted by the illness and death of her brother, Sept. 24, 1848, and on Dec. 19 Emily died of consumption, as her brother had done; within six months the youngest sister, Anne—

who had published a second novel in 1848, *The Tenant of Wildfell Hall*—also fell a victim to the same disease, and died May 28, 1849, while staying at Scarborough, where she is buried.

Charlotte rallied sufficiently to finish *Shirley*, which was published in Oct., 1849. During the next four years she paid several visits to London and met many distinguished authors, including Thackeray and Mrs. Gaskell. *Villette*, her last novel, did not appear until 1853. Though not equal to *Jane Eyre*, it is a masterpiece, and enhanced her reputation. On June 29, 1854, Charlotte married her father's curate, the Rev. A. B. Nicholls, of Banagher, Ireland. She died at Haworth, March 31, 1855, as the result of her confinement.

Charlotte Brontë's fame as one of the greatest women novelists of the 19th century is secure; *Jane Eyre* gave her an abiding place in literature. But Emily Brontë was the greatest genius of the family. Her poems show a sense of vision which those of her sisters lack, but her poetry has been long in gaining the appreciation it deserves, and *Wuthering Heights* is a greater novel than any of Charlotte's, though all are conspicuous for intense passion—woman's passion—the lyric note, and contempt for conventionalism. Anne Brontë merely reflects the glory from the brilliance of her sisters' works; neither her novels nor her poems show real genius.

The Brontë Society and Museum

Branwell Brontë, the ill-fated brother, became addicted to opium, a habit that hastened his death. His only claim to literature rests on the few poems published by A. C. Benson with those of his sisters. An oil-painting of a group of his three sisters which he painted in 1835, now in the National Portrait Gallery, was discovered in Ireland in 1913 as the result of the publication by Mrs. Ellis Chadwick of a photograph of the picture.

The cult of the Brontës was fostered by the foundation of the Brontë Society in 1893 at Bradford. A Brontë museum with relics of the Brontë family, autograph letters and MSS., drawings and paintings, and early editions of the Brontë works, opened 1895 at Haworth, was transferred 1928 to the old parsonage, which had been bought for the society by Sir James Roberts, a native of Haworth. Charlotte and Branwell contribute the greater part of the letters and drawings. In addition there are numerous portraits of the Brontës and their friends. The largest public collection of books

and magazine articles on the Brontës is to be found in the Gleave Brontë collection at Moss Side public library, Manchester.

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Brontometer (Gr. *brontē*, thunder; *metron*, measure). Instrument for recording the phenomena of thunderstorms. It was invented by the British meteorologist George James Symons, and first constructed in 1890. The records were made by pens on an endless roll of paper driven by clockwork, at the rate of 6 ft. per hour—some automatically, others by means of levers. It registered the duration of each peal of thunder, changes in atmospheric pressure, the velocity of the wind, etc.

Brontosaurus (Gr. *brontē*, thunder; *sauros*, lizard). Gigantic extinct reptile. It belongs to one of the orders of dinosaurs, the Saurischia, and is a typical member of the suborder Sauropoda. It had a short, bulky body supported on massive, post-like legs, the hind-legs longer than the fore-legs. Most of its enormous length of up to 70 ft. consisted of neck and tail, and the head was relatively very small. It probably lived in swamps and fed on waterweeds. Its remains have been found in Wyoming, U.S.A., in rocks of Upper Jurassic age.

Bronx, THE. Borough of New York city, the only one on the mainland. It became a borough in 1898, and was created a separate county in 1913. It has several large parks, notably the Bronx park, containing the New York botanical garden, with library and museum including a herbarium with two million specimens, and the zoological gardens, famed for their bison and deer. The borough is connected with Manhattan by several bridges across the Harlem river, and by tunnel. Its area is 42 sq. m. Pop. (1950) 1,451,277.

COMPOSITION AND USES OF TYPICAL BRONZES				
Name	Nominal Composition (per cent.)			Uses
	Copper	Tin	Other Metals	
Alpha Bronzes	95.5	3	Zinc 1.5	Coinage
	94	6	Phosphorus 0.4	Springs
Cast Phosphor Bronze	90	10	Phosphorus 0.05-0.5	Bearings and general engineering purposes
Admiralty Gunmetal	88	10	Zinc 2	General engineering applications, particularly marine, statuary, ornamental gates, etc.
Leaded Gunmetal	85	5	Zinc 5, Lead 5	Pressure-tight castings of all kinds
Leaded Bronze	85-70	10-5	Lead 5-25	Bearings
Bell Metal	80	20	—	Bells
Speculum Metal	70-60	30-40	—	Mirrors and as a decorative electro-plated coating

Bronze (Lat. *aes Brundisium*, Brindisi brass). Any alloy consisting mainly of copper with tin. Although more expensive and rarer than brasses, bronzes have a very wide range of uses from marine propellers to delicate works of art. Probably the oldest bronze in existence is a rod thought to have been cast c. 3700 B.C. which was found at Meyadim in Syria. This bronze rod contains 89.8 p.c. copper and 9.1 p.c. tin, a ratio close to that of current practice. The Trojans probably used bronzes with rather more copper; the Greeks c. 900 B.C. seem to have preferred pure copper. Old instruments and weapons made of bronze have been found in Babylonia, Assyria, Egypt, Cyprus, Asia Minor, Crete, China, and India.

The earliest bronzes have been found near rich tin deposits; probably they were in the first place produced accidentally, but, once the mixture had been discovered, some control of the constituents must have soon been introduced to improve quality. The Greeks introduced lead to improve moulding, while some old Chinese bronzes contain appreciable amounts of antimony.

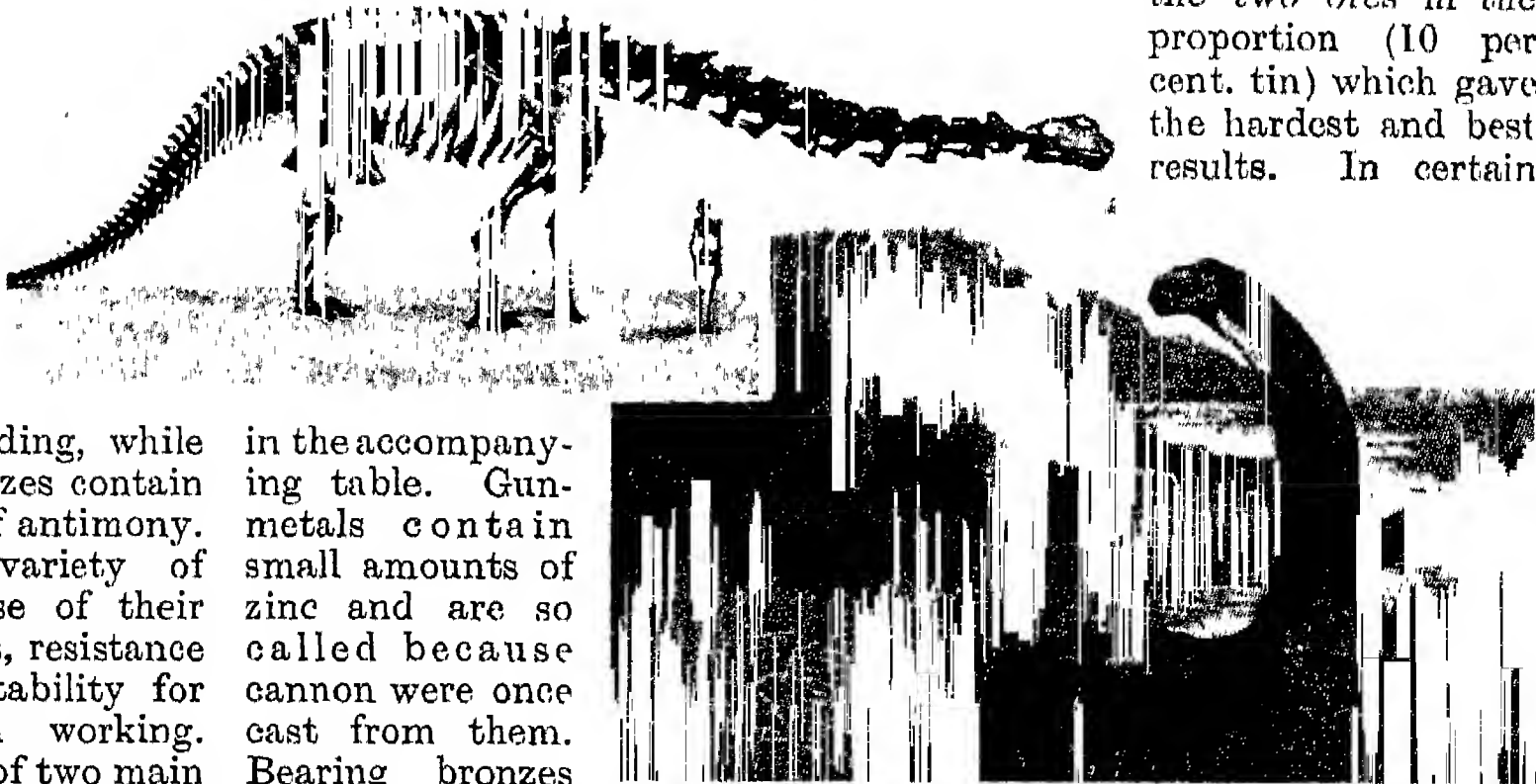
Bronzes have a variety of industrial uses because of their good casting properties, resistance to corrosion, and suitability for fabrication and cold working. Industrial bronzes are of two main groups: wrought alloys used in wire and strip form for springs and gauzes, and the more complex alloys used for engineering castings.

Alpha bronzes contain up to about 8 p.c. tin and can be brought to a spring hard temper by cold working. Phosphor bronze contains up to 4 p.c. phosphor, the phosphor having the effect of removing oxygen as phosphate and forming hard phosphides, the presence of which improves the hardness and fluidity of the alloy. Bronzes containing higher proportions of tin can be cold worked after suitable heat treatment to eliminate the presence of a tin-rich constituent which is hard and brittle.

The most important of the bronzes used for castings are the gunmetals, a phosphor bronze containing 10 p.c. tin; bell metal; speculum metal; and leaded bronzes. Some typical compositions and applications are given

lubrication may be poor. Aluminium bronze, which is an alloy of copper with up to 14 p.c. of aluminium, is not a true bronze and has its own entry in this Encyclopedia.

Bronze Age. Archaeological term denoting a cultural phase in which weapons and tools were made of bronze, an alloy of copper and tin; it was intermediate between the Stone Age and the Iron Age. In Egypt and in parts of Asia and Europe, the Bronze Age proper was prefaced by a stage called the Chalcolithic or Copper Age, characterised by the use of unalloyed copper. The first bronzes were no doubt produced by accident through the unconscious use of stanniferous copper ores: but the obvious superior hardness of tin bronze soon led to deliberate attempts to combine the two ores in the proportion (10 per cent. tin) which gave the hardest and best results. In certain



Brontosaurus. Above, skeleton of this prehistoric lizard contrasted with human skeleton; below, reconstruction of the brontosaurus as it probably appeared in life. See text, page 1480

Courtesy of the American Museum of Natural History

areas antimony, arsenic, or lead was used as an alternative to tin.

The earliest known true bronzes, dating to c. 3000 B.C., are from Mesopotamia, and were made by the Early Dynastic Sumerians and by their immediate predecessors of the Jamdat Nasr period. Types include axes, daggers, chisels, arrowheads, and articles for the toilet such as tweezers and pins. The smiths had already mastered the techniques of soldering, riveting, and casting *cire perdue*. Later they used bronze to adorn their temples, the metal being cast or hammered into decorative shapes. Exploitation of metal ores was here one aspect only of civilization, the process by which men were for the first time learning, as the result of really efficient food production, to live in city communities supporting specialised craftsmen organized by a literate ruling class.

Egypt was second only to Mesopotamia in the use and manufacture of copper implements in the pre-Dynastic period and in Early Dynastic times, but was slow in the manufacture of true bronze. Not until the XVIIIth Dynasty does it appear that tin bronze was in general use. Copper was mined in Sinai, where its discovery may have been the result of the search for turquoise for beads and malachite for eye-paint.

From Mesopotamia the knowledge of bronze spread eastward into Asia, where before the end of the third millennium it was in use at sites such as Mohenjo-Daro and Harappa in the Indus valley. In China it was in use by the middle of the second millennium B.C.

Introduction into Europe

The knowledge of bronze-working spread into Europe by way of two main routes, an inland route following the Danube and its tributaries, and a sea route following the Mediterranean coasts to the Atlantic and so on to Britain and Scandinavia. Centres of metallurgy arose wherever suitable metal ores were available, notably in the areas that became Hungary, Bohemia, Austria, Greece, Italy, Spain, and the British Isles. Denmark, though entirely lacking metal of its own, was able to barter amber (a substance particularly valued during the Bronze Age for beads and ornaments) for metal and so sustain a brilliant native school of bronze-smiths. Since tin is by far the rarer of the two component metals, regions rich in tin, e.g. Bohemia, parts of Spain, Brittany, and Cornwall,

became especially prominent in the working of bronze.

In Europe bronze was at first used in the manufacture of weapons such as daggers, rapiers, and spearheads, and axes—the last being perhaps the most essential in that a fundamental need of prehistoric man in temperate Europe was to conquer the deciduous forest which still covered much of the landscape. Not until the later phases of the Bronze Age was the new metal used in household objects such as cauldrons and cups, or for workmen's tools (sickles, hammers, gouges, chisels). Trinkets and objects of parade were from the first made of bronze as an attractive substitute for gold or silver, and continued to be made in bronze after the introduction of iron tools and weapons.

Mediterranean Bronze Age

In Mediterranean Europe, Bronze Age townships and walled cities such as Mycenae in Greece afford a detailed picture of the daily life of the period. Palaces, shrines, and houses were built in dressed stone; interior walls might be faced with plaster decorated with frescoes. The wealth of the community is indicated by store rooms for wine, oil, and treasure in precious metal. There must have been specialised masons, metal-workers, and potters. In Crete and Mycenaean Greece also, the necessity of keeping accounts led to the development of writing.

This degree of civilization did not spread until late in the Iron Age to temperate Europe, where there is less evidence of settled community life during a great part of the Bronze Age than during Neolithic times. The Early and Middle Bronze Ages saw the development of a pastoral economy, supplemented by hunting, at the expense of the cultivation of cereals in garden plots which had obtained in earlier times. House remains are very rare. Weapons and tools are therefore best known from burial mounds, in which it was the custom to inter grave-goods with the dead, or from hoards of bronzes deposited or lost by travelling merchants or smiths: an Early Bronze Age hoard from Bennewitz near Halle contained 297 axes.

In the West Mediterranean the rite of burial in communal megalithic tombs continued from the Neolithic period well into the Bronze Age; and it is probable that the builders of certain types of chamber tombs may be identi-

fied with the earliest seekers after metallic ores in, for example, Spain and Ireland. It was in the Bronze Age also that the massive circles and trilithons of such sanctuaries as Avebury and Stonehenge were erected.

Spread of the Plough

In the Late Bronze Age the spread of the use of the light plough or *aratrum* into the lands north of the Alps brought about an agricultural revolution. The cultivation of fixed fields and the intensification of trade along traditional routes, together with the influence of civilized communities to the south-east, led to a more settled way of life, if not necessarily a more peaceful one. The Late Bronze Age was probably a time of constant warfare among petty chieftains, between whose standard of living and that of their dependants there was a great gulf. During most of the period much of Europe was affected by successive migrations of the Urn-Field people (characterised by their rite of cremation in funerary urns) who were moving in a general direction from east to west.

Archaeology concerns itself with material culture, the development of which has no necessary connexion with the evolution of human types and languages. But it is possible by the end of the Late Bronze Age to point out archaeologically separable groups which were the ancestors of nations known to history—the Mycenaean Greeks in the Aegean, proto-Latin tribes in Italy, the Celts in S.W. Germany, and the Germans in Scandinavia and N. Germany.

Already at the beginning of the Bronze Age the Sumerians and the Egyptians were literate, so that more or less accurate dates for events in their histories may be deduced from a study of king lists, funerary monuments, and the like, from c. 3000 B.C. onwards. Where datable Sumerian or Egyptian artefacts occur in prehistoric contexts elsewhere in the East Mediterranean (as, for example, in Greece), they provide invaluable clues for dating the cultures of the less civilized communities. The typological development of the bronzes themselves from simple to more complex forms provides a second, though less reliable, means of relative dating. By these methods approximate dates for the various phases of the European Bronze Age are ascertained, although chronological schemes put forward by one authority are

usually subject to correction by the next after the discovery of new evidence or the re-consideration of the old. Scientific methods of dating such as radio-carbon analysis, in which the margin of error inherent in the method is wide, do not assist the dating of the comparatively short Bronze Age to the same extent as they do that of the Stone Age.

Bronze Age Periods

The European Bronze Age is commonly divided into three periods, Early, Middle, and Late. For the detailed study of pottery and metal types, it is sometimes sub-divided into six phases, A—F. Approximate dates are :

Early Bronze Age 1750–1400 B.C.
(Phase A)

Middle Bronze Age 1400–1200 B.C.
(Phases B, C)

Late Bronze Age 1200–650 B.C.
(Phases D, E, F)

In large areas of the world, *e.g.* in Africa outside Egypt, in Australia, and in the New World, bronze never came into general use, and the Stone Age continued until the introduction of iron by Europeans in modern times. *Consult* Ancient Bronze Implements of Great Britain and Ireland, J. Evans, 1881; The Bronze Age, V. G. Childe, 1930; Prehistoric Communities of the British Isles, V. G. Childe, 1940; Prehistoric Foundations of Europe, C. F. C. Hawkes, 1940; Dawn of European Civilisation, V. G. Childe, 4th ed. 1947; Metallurgy in Antiquity, R. J. Forbes, 1950; New Light on the Most Ancient East, V. G. Childe, 4th ed. 1952.

Audrey Furness

Bronze Powder. The generic name for finely crushed copper alloy powders, used for pigments, lithographic printing, decorative work, intaglio and surface printing, etc. The industry is long-standing, but improvements in technique have reduced the manual labour used, so that the product is better graded. The manufacture is described in an Egyptian-Greek manuscript of A.D. 300, now at Leyden.

Sir H. Bessemer (*q.v.*) developed a process, operated for secrecy entirely by his relatives which enabled him to monopolise the industry for many years. Before the First Great War Germany was the chief producer; plants are now in operation in Great Britain and the U.S.A. The raw materials are chiefly copper and zinc. Compositions may vary from 95 p.c. copper,

5 p.c. zinc, for the "pale-golds" to 70 p.c. copper, 30 p.c. zinc, for the "rich-golds." The alloy is made into ribbons by pouring molten metal on to a fly-wheel or the interior of a cylinder. Sponge-like nuggets made by pouring the molten metal into a stream of water under high pressure are an alternative. The product is then broken up by stamps until the desired fineness is obtained. The powder is polished for from 10 to 48 hrs. A little stearic acid may be added to give the so-called "lac" properties; some sort of heat colouring treatment may follow. Antique finishes may be obtained by the action of acetic acid and heat. Finally, the powder is sieved through a series of meshes.

Bronze Statuary. Form of art. It still enjoys great vogue, partly for its own sake and partly because it is exceptionally adapted to open-air exhibits. Of the two processes of casting—the *cire perdue* and the sand-mould—the first, or waste-wax method, is preferred by most sculptors. It admits of a much keener definition of the finer details of their work than the sand-mould method, while the risk of damage is almost negligible.

After the bust, statue, or other figure has been modelled in clay a mould of it is taken and filled with a core of plaster and pounded brick. This core is then coated with sculptor's wax, which exactly fits into the mould at every point, and has the thickness which the bronze skin is to have. The object having been protected from injury in the founding, it is next put into the furnace, and when the wax has melted, molten bronze is poured into the vacant space. In due course the article is withdrawn and allowed to cool. The core is then taken out and the sculptor goes over the bronze surface very minutely to remove any roughness or other imperfection due to the casting. After his treatment is completed the bust or statue will present as sharp and smooth a surface as that of the original model. The process is so called from the fact that the wax (*cire*) is lost (*perdue*) owing to the heat. Hollow casting is invariably adopted, since solid casting would vastly increase not only the weight of the figure but also the amount of its cost. Bronze assumes a beautiful greenish tinge with age and is capable of resisting the encroachments of the English climate.

Bronze-winged Pigeon. Name given to some six species of

pigeons found in Australia and the East Indies. They have metallic bronze green spots or patches on the upper wing coverts.

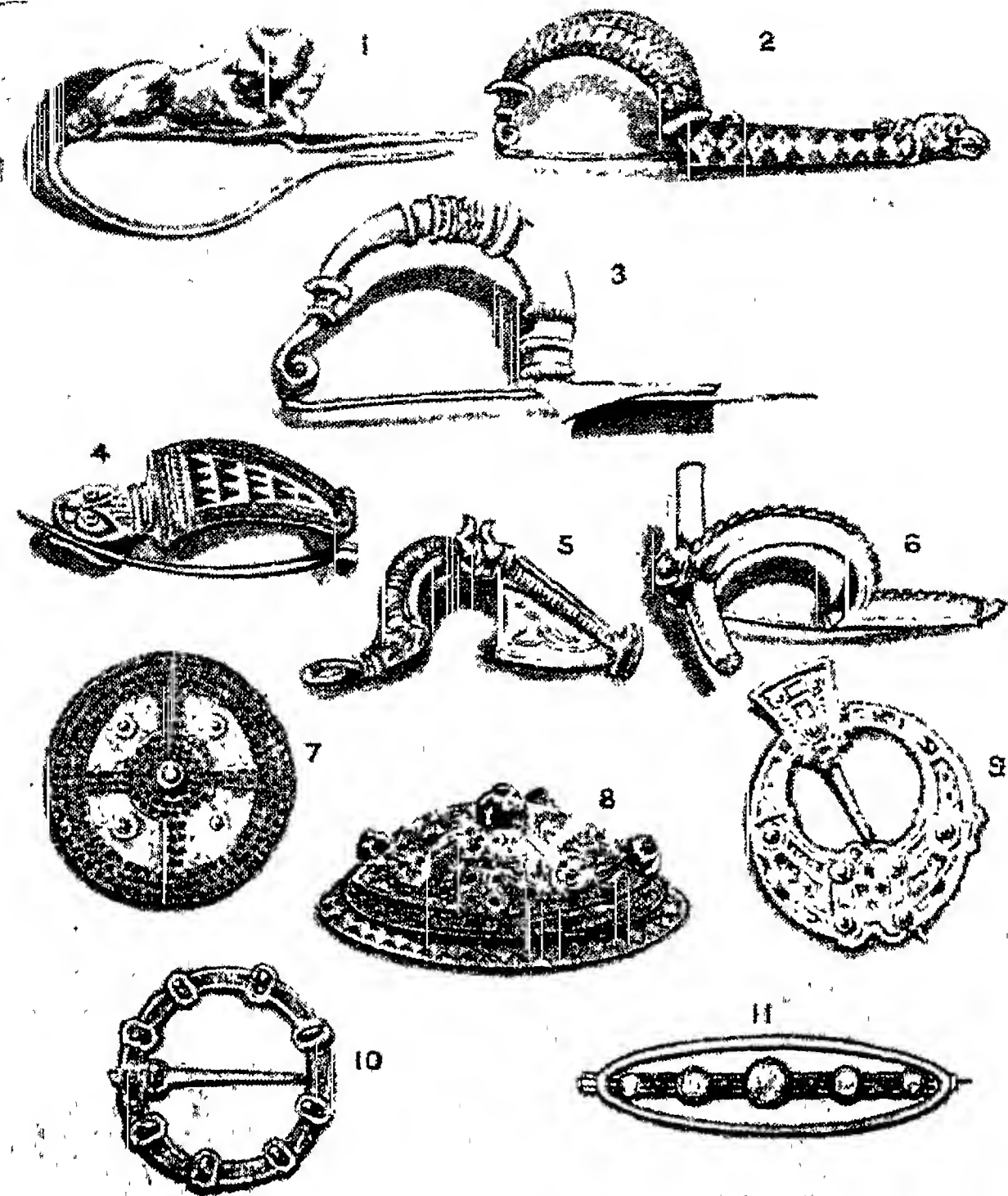
Bronzing. The art of metal colouring. Originally the term was restricted to the production of a permanent bronze colour on copper, but the field has broadened to embrace many processes and shades. Bronzing is not only ornamental but also protects against corrosion. Of mechanical and chemical methods, the latter are more widely used. The surface must be copper, brass, or silver, though steel, cast iron, and other metals may be bronzed by first coating them with one of these metals by electro-plating.

For mechanical bronzing, real bronze metal, containing 90 p.c. copper, 8 p.c. tin, and 2 p.c. zinc, is often used. This may be applied in the form of a lacquer. The copper in the alloy forms a thin surface film of copper oxide, giving an antique appearance. Parts standing in relief may be brought into contrast by rubbing off the surface with an abrasive.

The colours produced by chemical bronzing range from black to light blue and green. A series of shades from pale gold to crimson or purple is possible with a solution containing 12 oz. sodium thiosulphate, 8 oz. lead acetate, and 1 gall. of water. An apple-green patina may be produced by painting with this solution: sodium chloride, 20 oz.; vinegar, 1 gall.; ammonia, 16 fluid oz.; ammonium chloride, 20 oz. The beautiful Florentine bronze is applied to copper by a solution containing 1½ oz. of barium sulphide to a gall. of water. A similar solution on silver gives all shades of crimson, purple, and brown. Silver is often oxidised with a dilute solution of potassium sulphide and ammonium carbonate, to give a black surface. Coloured bronzes are used in textile printing.

Bronzino, IL. See Allori, Angelo.

Brooch OR FIBULA. Ornament that first came into use in the Bronze Age, probably in central Europe. It was developed from a simple safety-pin made of a single piece of wire, but more elaborate forms were rapidly invented. The ordinary brooch consists essentially of the bow, spring, and catchplate, though the spring may be absent and replaced by a hinge, or the bow may be replaced by an ornamental disk. The pennanular brooch of the Roman Empire, which was adopted and elaborated by the Irish, consisted of a loose



Brooch. 1. Gold brooch, 7th cent. B.C. 2. Gold brooch, 6th cent. B.C. 3. Silver, early 4th cent. B.C. 4. Inlaid brooch, Roman Empire. 5. Silver and gilt, 2nd cent. A.D. 6. Fibula, 3rd cent. A.D. 7. Enamelled Anglo-Saxon. 8. Scottish viking brooch. 9. Early Irish. 10. English, 14th cent. 11. Early 20th cent. gold and diamonds

pin fastened to a ring in which there was generally an opening.

Brook, CLIVE (b. 1887). British actor. A Londoner, born June 1, 1887, he was educated privately and made his stage début in 1919. In 1920 he appeared at the St. Martin's Theatre, London, and began his film



Clive Brook, British actor

career, which took him to the U.S.A. during 1924-1934. For more than 20 years he was a popular romantic actor, specialising in parts which called for faultless behaviour. Films in which he appeared included *This Freedom*, *Interference*, *Shanghai Express*, *Cavalcade*, *Return to Yesterday*, *On Approval*. Brook returned to the London stage in 1944, appearing e.g. in *The Years Between*, 1945, Aldous Huxley's *The Gioconda Smile*, 1948, and a revival of Wilde's *A Woman of No Importance*, 1953.

Brooke, FULKE GREVILLE, 1st BARON (1554-1628). English courtier and poet, well described in the epitaph he wrote for himself as "servant to Queen Elizabeth, councillor to King James, and friend to Sir Philip Sidney." Born at Beauchamp Court, Warwickshire,



Fulke Greville, Lord Brooke

and educated at Shrewsbury School (which he entered on the same day as Sidney) and Jesus College, Cambridge, he went to court with Sidney in 1577, and at once became a favourite. His attempts to share in various campaigns and hazardous enterprises were frustrated by the queen, and he at length settled to a civil career. He was M.P. for Warwickshire 1592-1620, treasurer of the navy 1598, chancellor of the exchequer 1614-1621. He was knighted 1603, and made a peer 1621. Stabbed by an

old servant, resentful at learning that he had been omitted from his master's will, Lord Brooke died Sept. 30, 1628. His most famous work is his biography of Sir Philip Sidney, but his poems and plays have always been of interest to scholars. One of his aphorisms is: "Man is the only creature with the power of laughter; is he not also the only one that deserves to be laughed at?" His complete works were edited for private circulation in 1870, by A. B. Grosart.

His cousin Robert, 2nd baron (1608-43), was a leader of the Parliamentary party against Charles I. He was killed while attacking Lichfield cathedral, March 2, 1643.

Brooke, SIR JAMES (1803-68). British soldier and administrator who became the first white rajah of Sarawak. Born in Benares, April 29, 1803, the son of an Englishman in the service of the East India co., he was educated at Norwich grammar school. Obtaining a commission in the army of the East India co. in 1819, he took part in the first Burmese war in 1826, was badly wounded, and sent home. He returned to India in 1830, but was obliged to leave the company's service, and returned to England via the Straits Settlements. It was possibly on this voyage that he first conceived the idea of carrying British commerce and civilization to the Malay archipelago. Brooke made a voyage to China in 1834. On the death of his father the following year, he inherited £30,000 and, having purchased a yacht, he sailed for Borneo in 1838. He arrived Aug. 15, 1839, on the north-west coast, in an area infested with pirates but nominally ruled by the Sultan of Brunei. He was courteously received by the sultan, whom he assisted to quell the rebellious tribes of the interior. In gratitude the Sultan conferred upon him in 1841 the title of rajah and governor of Sarawak, which at that time was only some 7,000 sq. m. in extent.

Brooke reformed the government and laws, put down the head-hunting of the Dyaks, and extirpated piracy in the neighbouring seas. He revisited England in 1847, was received by Queen Victoria at Windsor, and created K.C.B. In the same year he bought the island of Labuan for the British government and was made its first governor in 1846 and consul-general in Borneo. In 1851 a commission of investigation cleared him of charges of cruelty and illegality brought against him in the house of commons.

In 1857 he crushed at Kuching, the capital of Sarawak, a rebellion among a group of Chinese descent. His health failing, Brooke transferred the administration of the province to his nephew Charles and settled at Burrator, Devon, where he died, June 11, 1868. He bequeathed his sovereignty of Sarawak to his nephew, and, if male issue failed him, all the rights, privileges, and powers belonging thereto were devised to Queen Victoria.

Sir James Brooke's nephew, Charles Anthony Johnson Brooke (1829-1917), son of Sir James's sister Emma by her marriage with the Rev. Francis Johnson, served 10 years in the navy before joining his uncle in Sarawak in 1852. On his uncle's death in 1868 he succeeded as rajah and adopted the name of Brooke. During his rule the territory of Sarawak was increased to 47,000 sq. m. and in 1888 became a British protectorate, though still retaining internal independence. Brooke was knighted in 1888. He was succeeded as rajah by his son, Charles Vyner Brooke (b. 1874), knighted 1927, who abdicated in 1946.

Brooke, RUPERT CHAWNER (1888-1915). English poet. Born at Rugby, Aug. 3, 1888, where his



Rupert Brooke,
English poet

father was a house master, he was educated at that school, and at King's College, Cambridge. In 1911 his first volume of poems was published, and in 1913 he set out on a journey through America to the Pacific, passing some time in Fiji and describing his travels in letters to the Westminster Gazette. On the outbreak of the First Great War he received a commission in the Royal Naval div. and went to Antwerp, thence to the Mediterranean. He fell sick after a slight sunstroke at Lemnos, and died in hospital at Scyros, April 23, 1915.

Several volumes of his poems and other writings, which reveal an intense joy in living and alertness to physical delight, were published after his death. Grantchester, The Great Lover, and the 1914 Sonnets have retained enormous popularity. Brooke's personality as the poet who was also an athlete, the dreamer who also found adventure in travel and war, perhaps won him as many readers as did the quality of his verse. A

portrait memorial was unveiled in Rugby school chapel in 1919.

Brooke, STOPFORD AUGUSTUS (1832-1916). British man of letters. Born at Letterkenny, Donegal, Nov. 14.

1832, he went from school at Kilderrinster and Kingstown to Trinity College, Dublin. In 1857 he was ordained to a curacy in London. He went



Stopford Brooke,
British author

to Berlin as chaplain to the Princess Royal, and was subsequently minister of S. James's Chapel, York St., London, and between 1876-94 at Bedford Chapel, New Oxford St. This was a proprietary chapel, and he remained there when, in 1880, he left the Church of England and became a Unitarian.

Brooke's English Literature, 1880, widely influenced popular taste. His other volumes include the Life and Letters of F. W. Robertson, 1865; a study of Tennyson, 1894; and The Poetry of Robert Browning, 1902. His primer on Milton, 1879; History of Early English Literature to the Accession of Ælfred, 1892; and English Literature to the Norman Conquest, 1898, all bear witness to his learning. He wrote much on theology. He died March 18, 1916.

Brookeborough, SIR BASIL STANLAKE BROOKE, VISCOUNT (b. 1888). British politician, prime minister of Northern Ireland. Born June 9, 1888, he was educated at Winchester and Sandhurst. He succeeded his father as 5th baronet in 1907. M.P. for Lisnaskea in the parliament of Northern Ireland from 1929, he became minister of agriculture 1933, of commerce 1941, and prime minister in 1943. On receiving a peerage, 1952, he took the title Viscount Brookeborough, of Colebrook, N. Ireland.

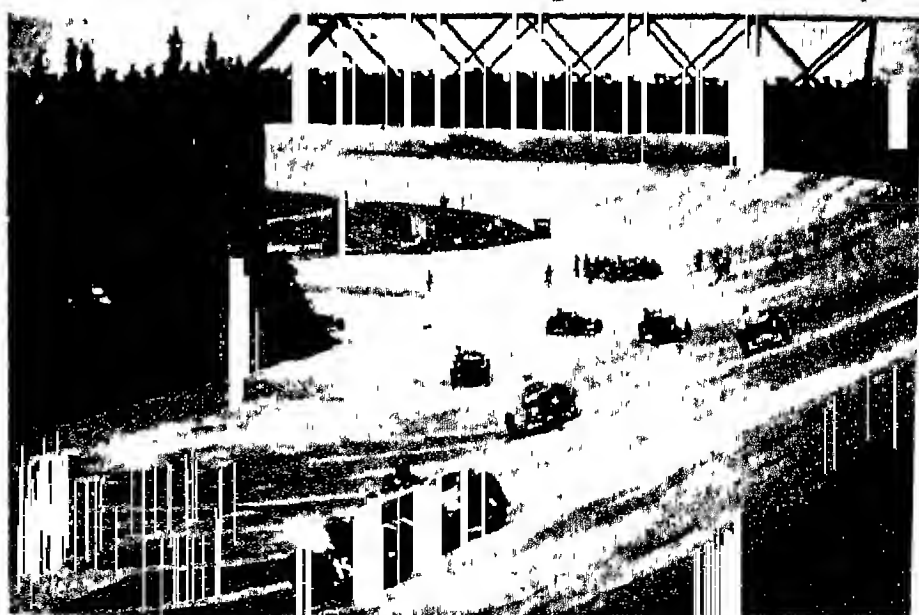
Brooke-Popham, SIR HENRY ROBERT MOORE (1878-1953). British air officer, knighted in 1927. Born Sept. 18, 1878, at Mendlesham, Suffolk, educated at Haileybury and Sandhurst, he qualified as pilot in 1911 and commanded a wing in France early in the First Great

War. Promoted air commodore, he was commandant of the staff college, Cranwell, 1921-26; of the Imperial Defence College, 1931-33; a.-o.-c.-in-c., Middle East, 1935-36. He retired from the R.A.F. 1937, but rejoined on the outbreak of the Second Great War in 1939, becoming c.-in-c. Far East in 1941. He relinquished his command in 1942, and died Oct. 26, 1953.

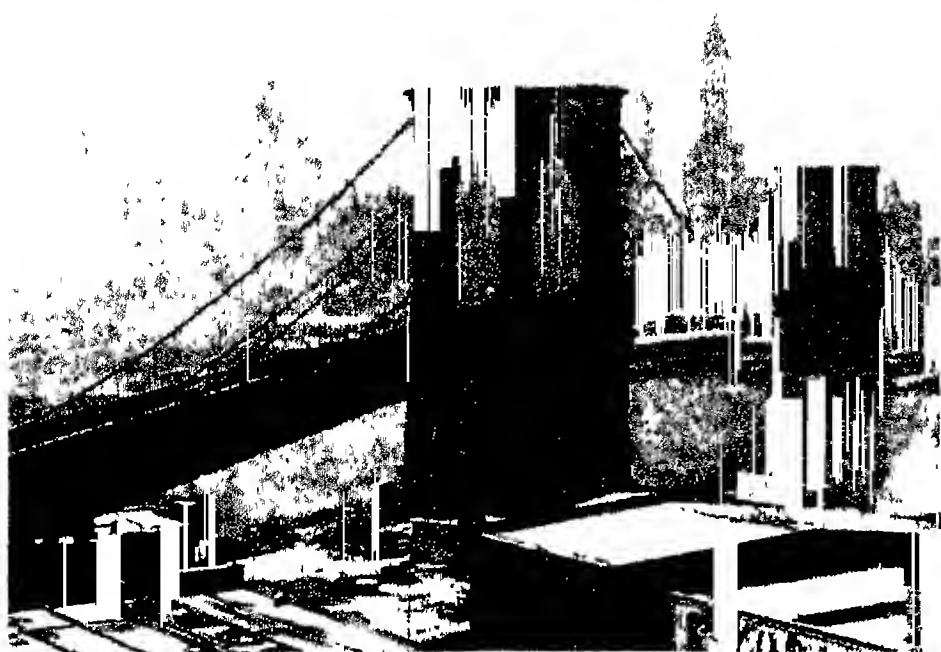
Brook Farm. Name of a farm at West Roxbury, Massachusetts, U.S.A., the home of a Socialist community founded in 1841. The idea originated with members of a Boston coterie known as the Transcendental Club, to which George Ripley, W. E. Channing, Emerson, Thoreau, Nathaniel Hawthorne, and Margaret Fuller belonged. Inaugurated on joint stock lines by George Ripley, as the Brook Farm Association of Agriculture and Education, the members included Hawthorne, Channing, G. W. Curtis, and C. A. Dana. In three years the membership reached seventy. In 1844 the concern was reconstituted on Fourieristic lines as the Brook Farm Phalanx, but this was dissolved in 1847. Consult The Blithedale Romance, N. Hawthorne, 1852; Brook Farm, J. T. Codman, 1894.

Brookite. A titanium-bearing mineral, titanium dioxide (TiO₂), crystallising in the orthorhombic system. It is trimorphous with rutile and octahedrite (anatase). It occurs in crystals, is of brownish colour, and has atomic structure similar to that of columbite. Generally it is of secondary origin derived from other titanium-bearing minerals occurring in some igneous and metamorphic rocks.

Brooklands. Formerly one of the world's most famous motor-racing tracks. It is near Weybridge, Surrey, England, 20 m. S.W. of London, and has a railway station. Opened in 1907, it had greater and smaller circuits of 3½ and 2 m. respec-



Brooklands. Bridge Bend at the former motor-racing track near Weybridge, Surrey



Brooklyn Bridge. Suspension bridge across East River, connecting Brooklyn with Manhattan, which is seen in the background

Brooks, CHARLES WILLIAM SHIRLEY (1816-74). British author and journalist. Born in London, April 29, 1816, son of an architect, and educated for the law, he took to journalism, was parliamentary reporter for *The Morning Chronicle*, and wrote leaders for *The Illustrated London News*. In 1851 he joined the *Punch* staff, inaugurated and wrote for twenty years the *Essence of Parliament*, and succeeded Mark Lemon as editor from 1870 until his death Feb. 23, 1874. A facile writer of verse, he was also the author of several novels and plays. Consult *A Great Punch Editor*, G. S. Layard, 1907.



Shirley Brooks, British author

Brooks, PHILLIPS (1835-93). American preacher and divine. Born at Boston, Massachusetts, Dec. 13, 1835, he was educated at Harvard. He was rector of churches in Philadelphia from 1859 to 1862 and at Boston from 1869 to 1891. In 1891 he was elected bishop of Massachusetts. He died at Boston, Jan. 23, 1893. Brooks enjoyed great popularity as a preacher of the liberal school of theology and as author of *The Influence of Jesus*, 1879. He also wrote the carol *O Little Town of Bethlehem*.



Phillips Brooks, American divine

Brooks's. London social club. It was formed in Pall Mall in 1764 by Almack (William McCall), a wine merchant, to provide an

alternative to the mixed company and publicity of the coffee houses. He was the first "master" of the club. He was succeeded in about 1774 by Brooks, for whom Holland built a house in St. James' Street. When this was opened in 1778, the club took the name of Brooks's. In its earlier years, the club was noted for its fashionable gambling, and was a Whig stronghold. It retains strong associations with the name of Charles James Fox, and the Fox Club meets there.

Brookwood. District in the parish of Woking, Surrey. The London necropolis is here, with a crematorium erected in 1889. Some 10,000 British and Allied dead of the Second Great War are buried here. There is also a mental hospital. Brookwood, 28 m. S.W. of London, has two stations, one called Necropolis.

Broom (*Cytisus scoparius*). A shrub of the family Leguminosae. A native of Europe, N. Asia, the



Broom (*Cytisus scoparius*), a heath and moorland shrub

Canaries, and the Azores, it attains a height of about 6 ft., and grows on heathlands. The branches are green and furrowed. The leaves are divided into three small leaflets covered with short silky hairs. The flower is of the pea type, but bright yellow; the petals and the sexual organs are so arranged that bees get dusted with the pollen and so are made use of in cross-fertilisation.

The seeds are produced in a black two-valved pod, and have an oil-body or elaiosome attached which is much appreciated by ants. These carry off the seeds to their runs, where the food body is bitten

off and eaten, and the uninjured part germinates far from the place where it was produced.

Broom corn is a name for Indian millet (*Sorghum vulgare*). Its branches, after the grain has been threshed out, are used instead of bristles for the manufacture of carpet brooms, clothes brushes, and similar articles.

Broome. Township on Roebuck Bay, Western Australia. On the N. coast of the state, in Dampier Land, it is the h.q. of a pearling fleet employing perhaps 1,000 divers, most of them Asians. Broome is in regular communication with Singapore and with other ports of Western Australia. It is the main town of a large pastoral area, and exports many head of cattle. It was the second town of Australia to be subjected to aerial attack by the Japanese (the first being Darwin). Pop. (1954) 1,114.

Broome, SIR FREDERICK NAPIER (1842-96). British administrator. Born in Canada, Nov. 18, 1842, the son of a clergyman, he was educated at Whitchurch grammar school, Shropshire. Between 1857-69 he was a sheep farmer in New Zealand, and wrote both verse and prose, on his return to England joining the staff of *The Times*. In 1875 he was made colonial secretary of Natal and in 1877 was transferred to Mauritius. From 1882 to 1890 he was governor of Western Australia. In 1890 he became governor of Barbados and in 1891 of Trinidad. Knighted 1884, he died Nov. 26, 1896.

Broome Park. Estate in Kent, once the home of Earl Kitchener. It is nearly midway between Canterbury and Dover. The handsome mansion, built about 1620, is sometimes identified with the Tappington Everard of Barham's *Ingoldsby Legends*. The estate was purchased by Kitchener in 1911.

Broomrape (*Orobanche*). Extensive genus of leafless root parasites of the family Orobanchaceae. It is a native of various temperate and tropical regions, but chiefly of Europe and E. Asia. Except just before the flowering time the plants are entirely subterranean, the rootstock being attached to the roots of clovers, furze, broom, hardheads, ivy, etc., from which they draw all their nourishment.



Broomrape

The flowering stem is a stout, fleshy growth, usually brown in colour, sparingly clad with thin scales, and ending in a crowded spike of two-lipped flowers.

Broschi, CARLO. Name of the Italian singer better known as Farinelli (q.v.).

Brose (old Fr. *brouez*, broth). Scottish dish of oatmeal on which boiling milk, water, or meat liquor is poured and stirred immediately. The various kinds of brose are named according to the ingredient added, such as water-brose, etc. Pease-brose is made with pease-meal and served with milk.

Broseley. Parish and town of Shropshire, England. It stands on the Severn, 14 m. S.E. of Shrewsbury, on the rly., and is in the borough of Wenlock. The parish church, rebuilt in 1845, is in the Perpendicular style. Broseley, once noted for its clay "churchwarden" tobacco pipes, makes tiles and bricks, and has coalmines. It was an important centre of iron smelting in the 18th century. Pop. (1951) 3,457.

Brosna. River of the Irish Republic flowing 30 m. S.W. through Westmeath and Offaly to the Shannon 2½ m. above Banagher. The Little Brosna, after a N.W. course of 10 m., enters the Shannon 3 m. below Banagher; it passes through a beautiful district.

Brosses, CHARLES DE (1709–77). French scholar and author. Born at Dijon, Feb. 17, 1709, he became a lawyer. As such he was for some years president of the parlement of Burgundy that sat at Dijon, but his time was mainly devoted to literary work. He wrote for the Encyclopédie and was acquainted with most of the great Frenchmen of his day. In 1750 he published a work upon Herculaneum, and when in Italy he wrote his Letters on that country, perhaps his most notable work; these were first published in 1799 and appeared again in the 19th century. Brosses wrote on the formation of languages, and also a history of the voyages to the southern (Australian) lands. He died May 17, 1777. *Consult* Life and Works, H. Mamet, 1874.

Broth. Kind of soup. It is made from the liquor in which meat, especially mutton or chicken, has been boiled.

Brothel (A.S. *breothan*, to go to ruin). Place to which men and women resort for illicit intercourse. The keeper of a brothel is liable to a fine of £100 or three months'

imprisonment for a first offence, increased to £250 or six months' imprisonment for later offences. Bordel (old Fr., small shelter) was confused with brothel and came to have the same meaning in Middle English. On account of the misuse made of bathing establishments, bagnio and stew were used as synonyms for brothel in the 17th cent.

Brotherhood. Primitive institution setting up a fraternal relationship between two men not brothers by birth or marriage. In some forms of blood-brotherhood the compact is sealed by an exchange of blood through transfusion or suction. The blood-rite may be performed with the blood of a sacrificial animal, or symbolised by an exchange of weapons, food (meal-communion), dress, or even names. The blood-covenant may be made between man and woman or between two women. It may extend to animals, disembodied spirits, or supernatural beings. In some tribes—e.g. Australian and Southern Bantu—boys initiated together are deemed to become blood relatives. The institution was long a living force among the Slavs.

Brotherhood. Association of men for religious or social objects. Such societies have been common in the Roman Catholic Church since the Middle Ages, and in certain cases, e.g. the third orders of S. Francis and S. Dominic, are under the direction of the Franciscan and Dominican friars. They arose to meet the needs of men who could not join a religious community, but wished to observe some simple rule of life and to unite in definite work of charity. Brotherhoods for teaching, for tending and nursing the sick, and for burying the dead are typical examples. Other confraternities are for prayer alone. In the late Middle Ages a number of brotherhoods, viz. Beghards and Beguines, Apostolic Brothers, Flagellants, and others, formed without authority, became sects and were condemned for heresy.

In the Church of England the brotherhood takes the form either of a religious order, as at Cowley, Oxford, or of a guild for prayer.

In Nonconformist churches it is associated with the Brotherhood Movement Inc., a development of the Pleasant Sunday Afternoon meetings. It consists of societies which are linked together into federations, and these combine to form the movement. With it is associated the Sisterhood movement. Both engage in social ser-

vice. The official organ is the Outlook, published monthly. Its work in other countries is carried on through the World Brotherhood Federation. It is non-sectarian and non-political. The headquarters are at Premier House, 150, Southampton Row, W.C.1.

In the U.S.A. brotherhood is sometimes part of the name of a trade union, e.g. the Brotherhood of Locomotive Engineers.

Brother Jonathan. Popular nickname for a citizen, or for the corporate citizenship, of the U.S.A., corresponding somewhat to the British John Bull. Its origin is doubtful; possibly it is derived from Jonathan Trumbull, governor of Connecticut during the War of Independence. When asked some difficult question, George Washington had a habit of saying, "We must consult Brother Jonathan."

Brothers of the Common Life. Religious community founded at Deventer, in the Netherlands, by Gerrit de Groote (Gerrit the Great, Germanised as Gerhard Groot, Latinised as Gerardus Magnus) (1340–84). He was assisted and succeeded by his friend Florens (or Florentius) Radewijns (1350–1400) who in 1386 founded the monastery at Windesheim, henceforth the centre of the community. The brotherhood was originally a group of young men who, without taking vows, aimed at the cultivation of the inner life. They neither asked nor accepted alms, but worked for their bread, chiefly by transcribing the scriptures and other religious works. Later they opened schools, and by the end of the 15th century these were to be found all over Germany and the Netherlands. More than half the schools had been closed during the troubled 16th century; the remainder struggled on until they too disappeared in the period of the French Revolution and the disturbances following it. Thomas à Kempis, Erasmus, and Adrian VI were notable men trained by the brotherhood.

Brough, LIONEL (1835–1909). British comedian. Born at Pontypool, Monmouthshire, the son of a



Lionel Brough,
British actor

brewer, he was educated at Manchester grammar school, and first appeared on the stage at the Lyceum in 1854. He held positions on the business

side of *The Daily Telegraph* and *The Morning Star*, and did not definitely become an actor until 1864 (Prince of Wales's, Liverpool). He played in comic opera, Shakespeare, or monologue; but was seen to best advantage in parts such as Tony Lumpkin, Bob Acres, or Sir Toby Belch. He died at South Lambeth, Nov. 8, 1909.

Brough, MARY (1863-1934). English actress. Born April 16, 1863, the daughter of Lionel Brough, she first appeared on the London stage at the Haymarket Theatre in *She Stoops to Conquer*, 1881—the occasion of Mrs. Langtry's stage début. She was associated with the long succession of farces by Ben Travers at the Aldwych Theatre (*q.v.*), appearing in broad comedy parts of the landlady or genial aunt types. She also played in film versions of these farces. She died Sept. 30, 1934.

Brough, ROBERT (1872-1905). Scottish painter. Born at Invergordon, after an apprenticeship to lithography in Aberdeen, he studied in the life school of the Scottish Academy at Edinburgh and under Benjamin Constant in Paris. In 1897 he settled at Chelsea, where he rapidly achieved success. He was elected an associate of the Scottish Academy, 1904. He was mortally injured in a railway accident near Sheffield, Jan. 20, 1905, and died next day.

Brougham. Covered carriage for four persons with box-seat for driver and footman, and drawn by one or two horses or propelled by motor. It was named after Lord Brougham, the designer of the first vehicle of the kind. A brougham seating only two persons is called a coupé or doctor's brougham.

Brougham. Parish and village of Westmorland, England. The Roman Brovacum, it is 2 m. S.E. of Penrith, and contains the ruins of an old Norman castle, formerly the seat of the Brougham family. Brougham Hall, 1 m. S., is sometimes called the Windsor of the North. The Brougham family sold it in 1934.



Brougham. Type of horse-drawn covered carriage designed by Lord Brougham early in the 19th century

Brougham and Vaux, HENRY PETER BROUGHAM, 1ST BARON (1778-1868). British lawyer.

Born in Edinburgh Sept. 19, 1778, he went to the high school and university there, and became an advocate in 1800. He was one of the founders of



Lord Brougham,
British lawyer

The Edinburgh Review, 1802, and in 1805 settled in London, associated himself politically with the Whigs, and in 1808 was called to the bar. He had already been on a mission to Lisbon, and he wrote, in the Whigs' interest, political pamphlets for the election of 1809. He added much to his growing reputation by conducting a case at the bar of the house of commons.

In 1810 Brougham was M.P. for Camelford. In 1812, however, he was defeated at Liverpool, and it was 1816 before he was returned for Winchelsea. By then Queen Caroline had asked his advice, and in 1820 he was made her attorney-general. He conducted her defence against George IV's action for divorce, thereby making himself on her victory the idol of the people, though he was refused silk by the King. During the next ten years he was a Whig leader. Interested in popular education, he was principal founder of University College, London, 1828. In the same year, in the house of commons, he made a great speech, lasting six hours, on legal reform.

On the formation of the Whig ministry of 1830. Brougham became lord chancellor, taking the title of Baron Brougham and Vaux. He at once started on the law reforms which he had long advocated, and besides speeding up the methods of the court of chancery, established the judicial committee of the privy council and the central criminal court. In 1835 Melbourne decided to

leave Brougham out of the cabinet, and his activities henceforth were mainly concerned with law reform and popular science. He was the first president of the Social Science Congress, 1857, and its president 1860-65. His mental powers began to fail in

1866, and he died at Cannes, May 7, 1868.

Brougham's versatility, his total incapacity to work in harness with colleagues, and his restless vanity and rashness of speech marred his political career. As a speaker he was always effective. His discovery of Cannes, where he was buried, made that place a popular health resort. *Consult* Life and Times, autobiography, 1871; Life, C. T. Garratt, 1935.

Broughton. Parish of Lancashire, England. It lies wholly within the borough of Salford (*q.v.*), and contains a Norman church, a town hall, and Broughton Old Hall, at one time the seat of the Stanleys and the Cheethams. There are a fine park and golf links. In Lancashire also is Broughton-in-Furness, 2½ m. S.W. of Coniston by railway.

Broughton, JOHN CAM HOBBHOUSE, BARON (1786-1869). British politician. Born June 27, 1786, he was educated at Westminster and Trinity College, Cambridge. After travelling on the Continent with Byron, he was Radical M.P. for Westminster, 1820-33, for Nottingham, 1835-46, and for Harwich, 1848-51. In 1819 he was imprisoned for breach of privilege for publishing a political pamphlet.



Baron Broughton,
British politician

A steady supporter of Liberal reforms, he was appointed secretary at war in 1832, chief secretary for Ireland in 1833, and was twice president of the board of control. In 1851 he was raised to the peerage. He is said to have invented the phrase "His Majesty's Opposition." The friend and executor of Byron, he wrote, in addition to his own travel books and various political works, *Historical Illustrations of the Fourth Canto of Childe Harold*, 1818. The peerage became extinct on his death, June 3, 1869. *Consult* his *Recollections of a Long Life*, ed. Lady Dorchester, 1909-11.

Broughton, RHODA (1840-1920). British novelist. Born near Denbigh, Nov. 29, 1840, the daughter of a clergyman, she achieved success with her first novel, *Not Wisely but Too Well*, 1867. This was followed by a long series, including *Cometh Up as a Flower*, 1867; *Red as a Rose is She*, 1870; *Nancy*, 1873; *Dear Faustina*,

1897, *The Devil and the Deep Sea*, 1910; *Between Two Stools*, 1912. She died June 5, 1920.

Broughty Ferry. Former police burgh of Angus co., Scotland incorporated 1914 with Dundee.

Brouwer, ADRIAEN (1605-38). Netherlands painter classed by some as of the Dutch, by others as of the Flemish, school. Himself an addict of the strong, possibly "doped" tobacco used by the poor of his day, he excelled in pictures of low life in taverns and tobacco dens. Born at Oudenarde, he was a pupil of Frans Hals at Haarlem from 1625 until he settled in Antwerp in 1632. There he was imprisoned by the Spaniards for a time, but was released through the influence of Rubens, who is said to have possessed 17 of his pictures. He died of plague at Antwerp. Brouwer's influence is noticeable in the work of both Teniers the younger and Adriaen Van Ostade. Brouwer is represented at galleries in London, Paris, Amsterdam, Munich, and elsewhere.

Brown, ALFRED ERNEST (b. 1881). British politician, known as Ernest Brown. Born at Torquay Aug. 27, 1881, and educated there, he contested several constituencies unsuccessfully as a Liberal candidate until elected M.P. for Rugby in 1923. He represented Leith from 1927 until the general election of 1945, joining the Liberal National party in 1931. Secretary to the mines dept., 1932-35. Brown averted a coalminers' strike in 1934, and entered Baldwin's cabinet in 1935. He held cabinet rank 10 years, as minister of Labour, 1935-40; secretary of state for Scotland, 1940-41; minister of Health, 1941-43; chancellor of the duchy of Lancaster, 1943-45; minister of Aircraft Production May-July, 1945. He was then created a Companion of Honour.

Brown, SIR ARNESBY (1866-1955). British painter. John Alfred Arnesby Brown was born at Nottingham and educated at Nottingham high school. He studied art with Andrew M'Callum, and at the Herkomer School,



Sir Arnesby Brown.
British painter

Bushey. He exhibited at the Royal Academy from 1890, mostly studies of the quiet beauty of the English countryside and of characteristic English sky effects:

and in 1907 his landscapes gained him the 1st gold medal at the International Exhibition in Vienna. Brown was elected R.A. in 1915, knighted 1938. He died at his home near Norwich, Nov. 16, 1955.

Brown, SIR ARTHUR WHITTEN (1886-1948). British airman. He was born in Glasgow and adopted engineering as a profession. He became interested in flying and served in the R.F.C. and R.A.F. during the First Great War. With Sir John Alcock (*q.v.*) he made the first flight across the Atlantic in June, 1919 (it lasted just over 16 hours), thus winning the Daily Mail prize of £10,000 offered for this feat, and was created K.B.E. in the same year. At the outbreak of the Second Great War he rejoined the R.A.F., but was compelled to resign in 1943 owing to ill-health. He died Oct. 3, 1948.

Brown, CHARLES BROCKDEN (1771-1810). American author. Born of Quaker stock at Philadelphia, Jan. 17,



Charles B. Brown.
American author
Miniature by Dunlop

1771, he studied for the law. He came under the influence of the French Revolution, and in 1797 went to New York. Inspired by Godwin's social teaching, he devoted himself to literature. The first professional American man of letters, he wrote the novels *Wieland*, or *the Transformation*, a story of ventriloquism, 1798; *Arthur Mervyn*, a tale of the yellow fever epidemic in Philadelphia, 1798-1800; and *Edgar Huntley*, the adventures of a somnambulist, 1801. His other works include *Ormond*, 1799, and *Clara Howard*, 1801. Brown also founded *The Monthly Magazine and American Review*, and *The Literary Magazine and American Register*. He died Feb. 22, 1810.

Brown, DOUGLAS CLIFTON. This former Speaker of the British house of commons is noticed as Ruffside, Viscount.

Brown, ERNEST WILLIAM (1866-1938). British mathematician and astronomer. Born at Hull, Nov. 29, 1866, he was educated at Christ's College, Cambridge. Appointed instructor in mathematics at Haverford College, U.S.A., 1891, and professor, 1893, he became professor of mathematics at Yale university 1907. In his *Tables of the Motions of*

the Moon, 1919, he showed that there are variations in the movement of the moon which are due not to gravity but to changes in the rate of rotation of the earth. From 1923 his tables were used in the Nautical Almanack for the calculation of the moon's position. Brown retired in 1932 and died at New Haven, Conn., July 22, 1938.

Brown, FORD MADOX (1821-93). British painter. Born at Calais, of British parents. April 16, 1821,



Ford Madox Brown
British painter

he received his early training in art at Bruges, Ghent, and Antwerp, exhibiting first at Ghent and in London at the R.A. in 1841. After studying in Paris, 1843-44,

he went to Rome, and in 1846 painted in London the picture of Shakespeare now in the Manchester art gallery. Two years later Brown was asked by D. G. Rossetti to become his teacher. This request brought him the friendship of the Pre-Raphaelites, with some of whom, though he never joined the brotherhood, he remained on intimate terms until his death. He was a contributor to their short-lived journal, *The Germ*; and the characteristic features of all his work, notably the fidelity to literal transcription and care for minute detail, resemble those of the Pre-Raphaelites. The symbolical picture entitled *Work*, which introduces into its crowded canvas portraits of Ruskin and Carlyle now in the Manchester art gallery, was begun in 1852 and finished in 1868.

In 1855 Madox Brown's finest painting, *The Last of England*, was completed. In this picture, now in the Birmingham art gallery, the artist portrayed himself and his second wife. *Christ Washing Peter's Feet*, produced in 1851 and several times repainted, was bought by the subscriptions of artists for the National Gallery, and now hangs in the Tate Gallery, London. A quarrel with the Royal Academy kept Brown from exhibiting at Burlington House after 1855. He is represented at the Luxembourg by Don Juan Found by Haidee.

To the old Working Men's College in London, from its foundation in 1854, Brown gave his time and work freely, desiring to develop an understanding of art in England, and during 1861-

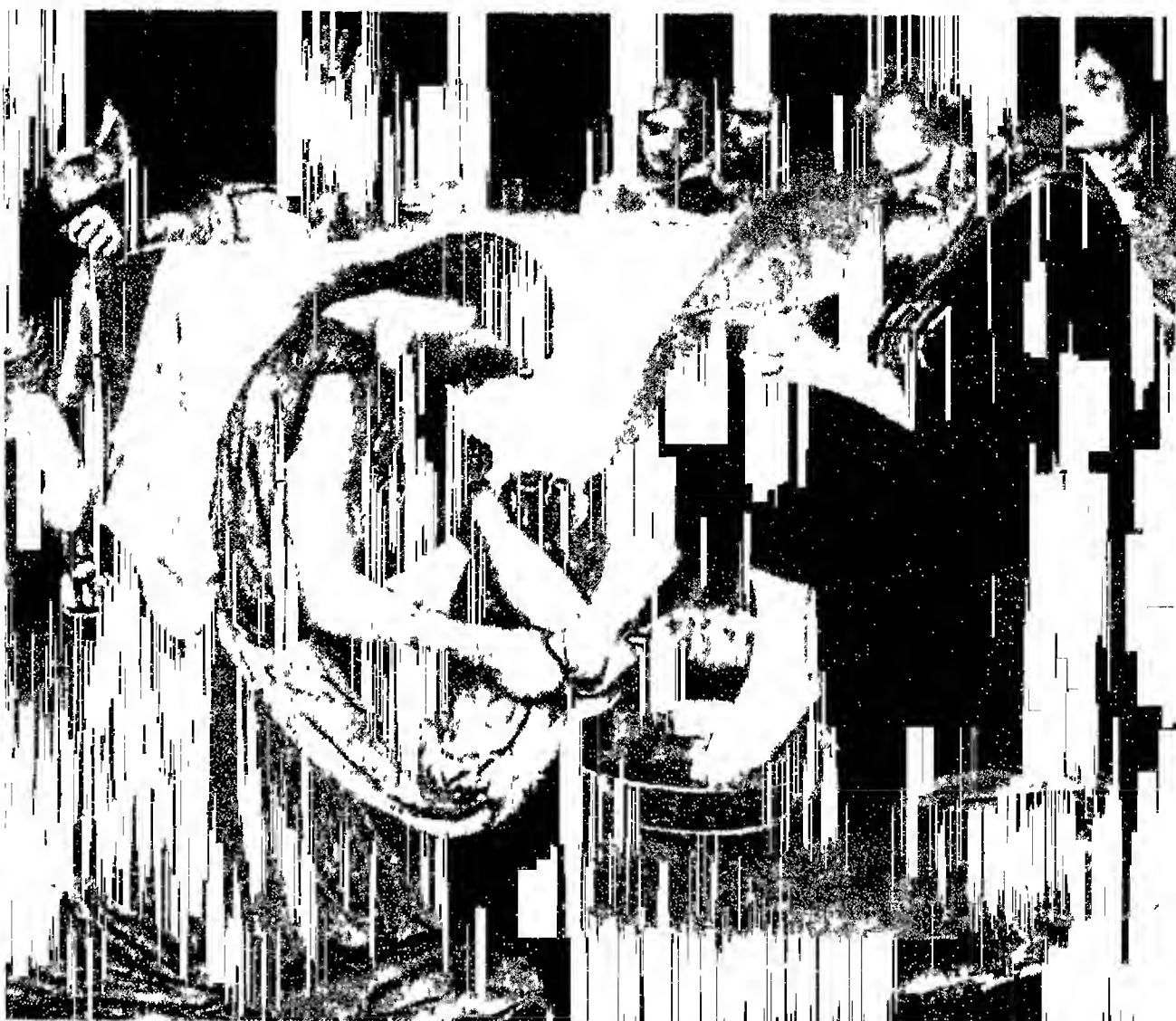
74 he was actively associated with William Morris. He died in London, Oct. 6, 1893.

Brown, FREDERICK RICHARD (b. 1910). England cricket all-rounder. Born at Lima, Peru. Brown played for Cambridge University and for Surrey 1930-31. and toured Australia in 1932-33. but took no part in test matches. In 1949 he accepted the Northants captaincy after receiving special M.C.C. registration, and captained England v. West Indies at the Oval in 1950 and the M.C.C. in Australia and New Zealand 1950-51. He was chairman of the test selection committee in 1953, and retired at the end of that season. He managed the team in S. Africa, 1956-57. Brown was also a hockey blue and played Rugby for Old Leysians.

Brown, GEORGE (1818-80). Canadian politician. Born at Edinburgh. Nov. 29, 1818, he went to New York, 1838, and thence to Toronto, 1843, where in 1844 he started *The Globe* as an organ of liberalism. He entered the legislature of Canada in 1851, and soon became the leader of the radicals and a spokesman of the anti-clericals of Upper Canada. To bring about the federation of Canada, Brown, in 1864-65, joined Sir John Macdonald in a coalition ministry, but resigned before the first Dominion parliament met in 1867. In 1873 he was made a senator, and on May 9, 1880, he died of wounds inflicted by a former employee.

Brown, GEORGE DOUGLAS (1869-1902). Scottish novelist. Born at Ochiltree, Ayrshire, he was educated at Glasgow university and at Balliol College, Oxford. In 1895 he came to London, where he wrote for the press and was reader for a publisher. *The House With the Green Shutters*, a sombre story of Scottish life and character, published in 1901 under the name of George Douglas, won immediate recognition. He died suddenly at Muswell Hill, London. Aug. 28, 1902.

Brown, GERARD BALDWIN (1849-1932). English scholar. Born in London, Oct. 31, 1849, he was educated at Uppingham and Oriel College, Oxford. He studied painting in London, and from 1880 to 1930 held the post of professor of fine art at Edinburgh university, and became famous as an authority on the history of art. *The Arts in Early England*, 1903-30, became the standard work on Anglo-Saxon, Celtic, and other early art forms. His other works include *The Art of the*



Ford Madox Brown's famous picture, *Christ Washing Peter's Feet*; a notable example of the pre-Raphaelite style of painting
Tate Gallery, London

Cave-dweller, 1930, and monographs on Hogarth, Rembrandt, and the Glasgow School of Painters. He died in Edinburgh. July 12, 1932.

Brown, HENRY KIRKE (1814-86). American sculptor. Born Feb. 24, 1814, at Leyden, Massachusetts, he studied painting under Charles Harding in Boston, and anatomy in Cincinnati, where he produced his first sculptures. From 1842 to 1846 he was in Italy, after which he settled in Brooklyn, N.Y. His most successful works were the equestrian statue of George Washington and the bronze statue of Lincoln, both in Union Square, New York; and the statue of General Greene at Washington. Brown was one of the first Americans to cast his own bronzes. He died at Newburgh, N.Y., July 7, 1886.

Brown, IVOR JOHN CARNEGIE (b. 1891). British writer and broadcaster, in particular of dramatic criticism. Born at Penang, April 25, 1891, he was educated at Cheltenham College and Balliol College, Oxford; he entered the civil service but resigned to take up literary work. His place in the front rank of dramatic criticism was gained by work for the *Manchester Guardian*, 1919-35, and the *Observer*, 1929-54. During 1940-42 director of drama for the council for encouragement of music and the arts, he was editor of the *Observer* 1942-48. His published works include among

novels *The Years of Plenty*, 1915, and *Marine Parade*, 1932; among political writings, *The Meaning of Democracy*, 1919; among essays *Masques and Phases*, 1926, *The Heart of England*, 1935; and a sequence illustrative of lightly-worn learning and sensitivity to the exact uses of language, which began with *A Word in Your Ear*, 1942. *Shakespeare*, a masterly critical study, appeared in 1949. He published an autobiography, *The Way of My World*, in 1954.

Brown, JAMES (1862-1939). Scottish politician. Born Dec. 16, 1862, he was educated at Annbank public school, and when still a young man evinced a great interest in miners' welfare. At 32 he was president of the Ayrshire Miners' Union, later becoming secretary of the National Union of Scottish Mineworkers. Entering parliament in 1918 as Labour member for S. Ayrshire, he represented that division until 1931 and from 1935 until his death. In 1924 he was appointed lord high commissioner to the general assembly of the Church of Scotland, filling the same office in 1930 and 1931. Brown died at Ayr, March 24, 1939.



James Brown, Scottish labour leader and politician

Brown, Sir John (1816-96). British steel manufacturer. Born in Sheffield, Dec. 6 1816, the son



Sir John Brown,
British manufacturer

of a slater, he was apprenticed to a firm of cutlers but soon set up in business for himself. His fame rests upon his improvements in armour-plating for warships by rolling instead of hammering. Orders for armouring the British warships followed, and the enormous Atlas Works at Sheffield were built for the manufacture not only of armour-plates but also of steel rails and other railway material. Twice mayor of Sheffield, Brown was knighted in 1867, and died Dec 27, 1896.

Brown, John (1735-1788). Scottish physician. Born at Buncle, Berwickshire, of humble parentage, he was for some time a pupil teacher at Duns. Having decided on a medical career, he studied at Edinburgh, earning a living by taking pupils.



John Brown

He graduated in medicine at St. Andrews, 1779, and devoted his time to exposing the errors of the existing medical systems. In 1780 he set forth his own views in *Elementa Medicinae*, a book which was translated into several languages.

Brown condemned blood-letting and the lowering of a patient's vitality, declaring rather for strengthening the system, and in general anticipated the doctrines which have become medical commonplace. These views caused him considerable unpopularity and financial loss, and he was at one time in prison for debt. In 1786 he settled in London, where he translated his *Elementa Medicinae*, wrote and lectured, and where he died Oct 17, 1788. Brown's doctrine, known as the Brunonian, attracted great attention abroad. It provoked long controversy, especially in Germany.

Brown, John (1800-1859). An American abolitionist. Born in Connecticut, May 9, 1800, he led a wandering life until middle age, when he became an ardent supporter of the movement for the abolition of slavery. In 1855 he joined his sons in Kansas, and led

the free-state party in a series of desperate border fights. His stand at Ossawatimie in 1856 brought him support from many abolitionists in the northern states.

On Oct. 16, 1859, with 21 followers including three of his sons, he seized the national arsenal at Harper's



John Brown,
American abolitionist

Ferry, hoping to encourage a general rising of the slaves. But no response came, and troops under Robert E. Lee recovered the arsenal. Brown made a desperate resistance, and did not surrender until he had been seriously wounded and two of his sons killed. He was tried, found guilty of treason, and hanged at Charlestown, Dec. 2, 1859. He was generally regarded by the abolitionists as a martyr to their cause, and in the North a popular song immortalised his name:

John Brown's body lies a-mouldering in the grave,
But his soul goes marching on.

See *Life and Letters*, ed. F. B. Sanborn, 1885; *Life*, O. G. Villard, 1910.

Brown, John (1810-82). Scottish writer and physician. Born at Biggar, Lanarkshire, Sept. 22, 1810, the son of a minister and Biblical scholar, he was educated at the high school and university of Edinburgh. Having qualified as a doctor, 1833, he practised in the city until a short time before his death, May 11, 1882.

Brown was the author of *Rab and his Friends*, 1859, and of three volumes of *Horae Subsecivae—Leisure Hours—humorous essays*, with something of the charm of Lamb, on a variety of subjects, many medical, and others on art, poetry, and scenery. Among his friends were Lords Cockburn and Jeffrey, Thackeray and Ruskin.



John Brown,
Queen Victoria's
servant
Downey

See Dr. J. B. and his sisters, E. T. MacLaren, 6th ed. 1901; *Biog and Criticism*, J. T. Brown, 1903; *Letters*, ed. Brown and Forrest, 1907.

Brown, John (d. 1883). Scottish servant to

Queen Victoria. A Highlander, he entered the royal service in 1849, and was for many years confidant and friend of the queen. He died March 27, 1883. Victoria dedicated to his memory *More Leaves from the Journal of a Life in the Highlands, 1862-82*, and erected a statue to him at Balmoral.

Brown, Lancelot (1715-83). British landscape gardener, known as Capability Brown. Born in Northumberland, he became a gardener at Stowe House, Buckingham, where he showed remarkable ability in planning gardens to give the full effects of the natural scenery. To employ Brown became a fashion among the rich, and he was responsible for gardens at many of the greatest houses in England, including Blenheim and Kew; he also developed abilities as an architect of country houses, Croome Court being one of his buildings. He amassed wealth, and died Feb. 6, 1783. He received his nickname from his habit of saying a site had "capabilities."

Brown, Robert (1773-1858). Scottish botanist. Born at Montrose, Dec. 21, 1773, he was educated at Aberdeen and Edinburgh for the medical profession. For five years (1795-1800) he was a surgeon in the army, which he left to join Flinders in his expedition to New Holland (1801-05). He was soon recognized as the leading systematic botanist in Britain. He declined the chairs of botany at Edinburgh and Glasgow, but on the death of Banks and the transfer of the Banksian herbaria to the British Museum he accepted the position of keeper of the botanical department there in 1827. He was president of the Linnean Society, 1849-1853, and died June 10, 1858. See *Brownian Movements*.

Brown, Thomas Edward (1830-97). British poet who wrote many of his poems in Manx dialect. Born at Douglas, Isle of Man, on May 5, 1830, the 6th of 10 children, and educated at King William's College, and Christ Church, Oxford, he became a fellow of Oriel, 1854, and was ordained 1855, returning to the Isle of Man as vice-principal of King William's College. In 1861 he became headmaster of the Crypt school at Gloucester, and during 1864-92 was an assistant master at Clifton College. On his retirement he went back to the Isle. He died while on a visit to Clifton, Oct. 30, 1897.

T. E. Brown's longer works are narrative poems characterised by imagination and sincere feeling. Of his shorter poems, the one that

begins "A garden is a lovesome thing, God wot" is probably the best known, and has earned him an undue share of denigration as the begetter of what has been called "god-wottery." His earliest piece Betsy Lee, 1873, was included in Fo'sle Yarns, 1881. His collected poems, edited by W. E. Henley, were published in 1900, in which year also two vols. of letters appeared.

Brown, WILLIAM (1777-1857). Irish-American sailor, known as Almirante Brown. Born in Ireland, he emigrated to S. America when a boy. He served on a merchantman, and then, after some years as a pressed sailor in the British navy, became captain of a trading ship. In 1814 he took a command in the Argentine navy and showed his skill against the Spaniards. In 1825, on the outbreak of war with Brazil, he returned to the navy and defeated the Brazilians in several engagements. During the war of 1842-45 he blockaded Monte Video and fought against Garibaldi. He died May 3, 1857.

Brown, WILLIAM JOHN (b. 1894). British politician. Educated at a Margate elementary school and Sir Roger Manwood's grammar school, Sandwich, he entered the civil service as a boy clerk. From 1919 to 1942 he was the general secretary of the Civil Service Clerical Association.

Returned to parliament as Labour member for W. Wolverhampton, he held the seat until 1931. In 1942, having re-entered parliament as independent member for Rugby at a by-election, he was made parliamentary gen. sec. of the C.S.C.A., resigning 1948; he lost his seat 1950. Publications include: *The Civil Service Compendium: Three Months in Russia*; *I Meet America*; *So Far* autobiography.

Brown Bess. Familiar name for the flint-lock musket used by the British army during the Waterloo period. The weight of the musket with bayonet was 11 lb. 4 oz., calibre of barrel .753 in., and of bullet, .68 in. The bullets weighed 14½ to the lb. and were large enough to break

a horse's leg. Three flints were allowed for every 60 rounds fired. The bayonet length was 17 ins.

Brown Coal. Brown lignite of dull lustre, occurring in seams up to more than 30 ft. in thickness. It is of Mesozoic (Jurassic and Cretaceous) and Tertiary ages. All types occur between macro-fragmental, dominantly woody, and largely micro-fragmental fuels. The lignites and brown coals, intermediate in rank (degree of metamorphism or alteration from the original peat) between peats and per-bituminous coals, burn with a smoky flame, have low calorific value, and are non-coking. They contain a high percentage of water, and slack badly on exposure to weather. They are important locally as a fuel in the absence of better quality coals, particularly in Germany and mid-west N. America.

Browne, CHARLES FARRAR (1834-67). An American humorist, better known under his pseudonym, Artemus Ward (*q.v.*).

Browne, GEORGE, COUNT VON (1698-1792). Irish soldier of fortune. Born in Limerick, June 15, 1698, he served the elector palatine for five years, and joined the Russian army in 1730. He fought in the wars with Turkey and Sweden, in the Seven Years' War, and against the Danes. In 1763 he was made governor of Livonia. He died Feb. 18, 1792. His nephew, Maximilian Ulysses, Count von Browne (1705-57), was one of Maria Theresa's most distinguished generals.

Browne, HABLOT KNIGHT (1815-82). British artist, chiefly remembered as Phiz, the illustrator of the



H. Browne
(Phiz)

works of Dickens. Born at Kennington, London, June 15, 1815, he studied at the St. Martin's Lane academy. His connexion with Dickens began in 1836, when he was chosen to succeed Seymour as illustrator of *The Pickwick Papers*. David Copperfield, Martin Chuzzlewit, Nicholas Nickleby, Dombey and Son, Bleak House, Little Dorrit, and *A Tale of Two Cities* were all illustrated by him. After 1860 he illustrated some of the novels of Lever and Harrison Ainsworth. Partially paralysed in 1867, he continued his work until his death at Brighton, July 8, 1882. *Consult* Life, D. C. Thomson, 1884.

His son Gordon Frederick (1853-1932) was also well known as a magazine and book illustrator.

Browne, MAURICE (b. 1881). British actor-manager and dramatist. Born at Reading, Feb. 12, 1881, he was educated at Winchester and Peterhouse, Cambridge. He was co-founder, with Harold Monro, of the Samurai Press 1906-8, from which the Poetry Bookshop originated; and in 1912 he became director of the Little Theatre, Chicago, the parent of little theatres in the U.S.A. As manager of the Savoy Theatre, London, he produced *Journey's End* in 1929. He wrote several plays, including *The King of the Jews*, and *Wings over Europe* (with Robert Nichols).

Browne, ROBERT (c.1550-1633). Puritan divine, founder of the Brownists. Born at Toilethorpe, Rutland, of good family, and educated at Corpus Christi College, Cambridge, he was for a time a schoolmaster and an open-air preacher in London. In 1578, having then been ordained, Browne left the Church of England. He maintained that each congregation must be free and self-governing, and that episcopal authority and ordination by bishops or presbyters were contrary to Christ's gospel.

For eighty years Browne continued his crusade, removing with his followers to Holland for two years, 1581-83, and preaching unsuccessfully in Scotland in 1584. In 1586, after being formally excommunicated by the bishop of Peterborough, he gave up his separatism, and in 1591 was made rector of Achurch, Northamptonshire. When over 80 he was sent to prison for assaulting the parish constable on demand of a rate, and he died in Northampton gaol. *See* Brownists.

Browne, SIR THOMAS (1605-82). English physician and author. Born in Cheapside, London, Oct. 19, 1605, son of a prosperous mercer, he was educated at Winchester and Broadgates Hall (Pembroke College), Oxford. After studying medicine at Oxford, Montpellier, Padua, and Leyden, he



Sir Thomas Browne,
English physician
*From a painting in the
Hall of Physicians*

settled as a physician at Norwich. He was knighted by Charles II in 1671, and dying Oct. 19, 1682, was buried in the church of S. Peter Mancroft, whence his

Brown Bess,
a flint-lock
musket

skull was removed to the hospital museum at Oxford in 1840.

A royalist and a scholar, he was tolerant and broad-minded; but he preferred the astronomy of Ptolemy to that of Copernicus, and, with other learned men of his time, he believed in witchcraft, astrology, and alchemy. As a writer he inaugurated the grand style in English prose, but is often obscure through his habit of seeking to express a thought in a single word, in quest of which he chose Latin or Latinised English. His writings are valuable as illustrating the history of English prose, for their influence on such writers as Coleridge, De Quincey, and Lamb, and as expressing the character of their author.

Religio Medici, or the religion of a physician, an attempt to reconcile faith and reason, appeared in 11 editions between 1643–81. *Pseudodoxia Epidemica*, 1646, discusses a variety of legends and beliefs. *Hydrotaphia*, 1658, a dissertation on funeral customs, was inspired by the discovery of sepulchral urns in Norfolk, and closes with a passage of unsurpassable eloquence. *The Garden of Cyrus*, published with the *Hydrotaphia*, is a study of the quincunx, or arrangement of five things in a square. The posthumous *Letter to a Friend* appeared in 1690; *Christian Morals*, in 1716, being later edited by Johnson. *Consult Works*, ed. C. Sayle, 1904–7; ed. G. Keynes, 1932; *Life*, E. Gosse, 1905.

Browne, THOMAS ARTHUR (1870–1910). British painter and black-and-white comic artist. He was born on Dec. 8, 1870, at Nottingham and educated at S. Mary's national school in that city. He worked in the local lace market at the age of 11, served as apprentice to a lithographic firm 1884–91, left Nottingham for London 1895, exhibited at the R.A. for the first time in 1897. In that year he founded at Nottingham the colour-printing firm of Tom Browne & Co., was elected to the R.B.A. in 1898 and the R.I. in 1901. He excelled in humorous line work, and was one of the leading comic artists of his time. As versatile as he was popular, he created the famous tramp characters Weary Willie and Tired Tim. He died March 16, 1910.

Browne, WILLIAM (1591–1643). English poet. Born at Tavistock, and educated at Exeter College, Oxford, his great work, *Britannia's Pastorals*, is in three books, the third of which was not published

until 1852, by the Percy Society. The famous lines, *Underneath this Sable Hearse*, have been attributed to him and to Ben Jonson. *Consult Works*, ed. W. C. Hazlitt, 1868; *Poems*, ed. G. Goodwin, 1894.

Brown House (*Braunes Haus*). Headquarters in Munich of the National Socialist party from 1931. It was built allegedly to a plan designed by Hitler but showed Speer's rectangular pseudo-Renaissance style, most pronounced in the later-erected pretentious Führer-Haus. The Brown House, so called because of its colour chosen in association with the brown shirt of the party, contained the supreme S.S. and S.A. headquarters, assembly rooms, and secret archives. It was severely damaged in Allied air raids.

Brownian Movements. Name for certain wobbling movements of very small particles of matter, or of minute organisms, first observed by Robert Brown, the botanist. In 1827, while examining finely divided particles of matter suspended in turbid liquids, he noticed and described a peculiar and perpetual movement among them. The explanation of the Brownian movement depends on the molecular theory of matter. The liquid in which the tiny particles are floating consists, according to this theory, of a vast number of molecules in a state of perpetual and violent motion, which may be compared with that of a swarm of gnats. The actual molecules are far too small to be seen even through the most powerful microscope, and their existence is inferred from theoretical considerations. The particles of suspended matter, which we can see in motion through the microscope, are of enormous size compared with the molecules. But the molecules perpetually beating on these particles, and often with considerable velocities, produce in them a continual though comparatively slow motion, and this is the Brownian movement—the visible result of molecular bombardment. The existence of a Brownian motion sets a limit to the sensitivity attainable with suspended systems such as those of galvanometers. See *Molecules*.

Brownie. Fairy of Scottish tradition. Mostly of a helpful kind, if placated by a bowl of milk

set aside for them, brownies would perform various kinds of domestic work while the household slept. This fairy is described as taking the form of a tall man.

Brownie. Name given to youngest grade of the Girl Guides. They are girls between the ages of eight and eleven. See *Girl Guides*.

Browning, ELIZABETH BARRETT (1806–61). British poet. Elizabeth Barrett Moulton-Barrett was born at Coxhoe Hall, near Durham, March 6, 1806; her girlhood was passed at Hope End, Herefordshire. There she "had fits of Pope and Byron and Coleridge, and read Greek as hard as some of your Oxonians in the Bodleian, and gathered visions from Plato and the dramatists." Her precocity was shown by the composition of an epic in four books on the battle of Marathon in her fourteenth year; her scholarship by a translation of *Prometheus Bound*, 1833. At fifteen, a fall from a pony left her an invalid for many years.

The publication of *Poems*, 1844, was an event of importance in Victorian literature. Among the poems were *A Drama of Exile* and the often quoted *Cry of the Children*.

Her romantic marriage with Robert Browning, Sept. 12, 1846, gave her a new lease of life and brought her happiness, marred only by the

fact that her father never forgave her. Her *Sonnets from the Portuguese*, inspired by Robert Browning's courtship, but shown to him first and published after their marriage, were entirely original and constitute her most notable work. They were privately printed in 1847, but did not appear under their author's name until 1850. There followed *Casa Guidi Windows*, 1851; a metrical romance, *Aurora Leigh*, 1857; and *Last Poems*, 1862. She collaborated with R. H. Horne and others in modernising Chaucer, 1841. She died at Florence, June 29, 1861, and was buried in the English cemetery there, her tomb being designed by Frederick Leighton.

Bibliography. *Life*, J. H. Ingram, 1888; *Letters to R. L. Horne*, ed. S. R. T. Mayer, 1877; *Letters*, ed. F. G. Kenyon, 1897; *Letters of R. B. and E. B. B.*, repr. 1899; *E. B. B.*, a portrait, I. C. Clarke, 1929; *Letters to her Sister*, ed. L. Huxley, 1929; *Life*, D. Hewlett, 1953; *E.B. to Miss Mitford*, ed. B. Miller, 1954; *E.B. to Mr. Boyd*, ed. B. D. McCarthy, 1956.



E. Barrett Browning,
British poet

From a drawing by W.
Talfourd, Nat. Port. Gallery

Browning, (OSCAR (1837-1923). British writer. Born in London, Jan. 17, 1837, he was educated at



Oscar Browning.
British author
Russell

Eton and King's College, Cambridge. He was a master at Eton 1860-75, and then, returning to Cambridge, devoted himself to college and university work. He was

university lecturer in history and principal of the University Day Training College, 1891-1909. He died Oct. 6, 1923.

Browning's many books include *Lives of George Eliot*, 1890; *Dante*, 1891; and *Goethe*, 1892. He also wrote *Introduction to the History of Educational Theories*, 1881; *History of England*, 1890; *Wars of the 19th Century*, 1899; *History of the Modern World*, 1815-1910; 1912; *History of Medieval Italy*, 1914; *General History of Italy*, 1915. As a Liberal he unsuccessfully contested Norwood, 1886; E. Worcestershire, 1892; and W. Derby, 1895. Consult his *Memories of Sixty Years*, 1910.

Browning, ROBERT (1812-89). British poet. He was born at Camberwell, May 7, 1812, both his father and grandfather being clerks in the Bank of England. His father, also Robert Browning (1781-1866), married a lady from Dundee named Wiedemann, and in addition to the poet they had a daughter, Sarianna, who lived until 1903. Robert was sent to a school at Peckham, but his education was mainly received in his father's library and at the hands of a private tutor. Like Milton he loved music, and like Milton he early determined to make poetry the occupation of his life. Hence forth his aim was "to see life in its best sense, and cultivate the powers of his mind."

With this object Browning visited Russia in 1834 and Italy in 1838. The latter journey was the beginning of a long and intimate connexion with Italy which profoundly influenced his work. But already his poetic career was begun. *Pauline*, 1833, was succeeded by *Paracelsus*, 1835; in 1837 *Straford* was produced by Macready at Covent Garden. A series of dramatic works followed. The beautiful *Pippa Passes*, 1841, a collection of dramatic scenes rather than a drama, opened the series entitled *Bells and Pomegranates*. It was followed by *King Victor and King Charles*, 1842; by *The Return of the Druses* and *A Blot*

in the *Scutcheon*, 1843, each of which is said to have been written in five days; and by *Colombe's Birthday* 1844, the most charming, as *A Blot in the 'Scutcheon* is the most intense, of Browning's dramas. *Colombe's Birthday* was the last play which Browning wrote for the stage. *Luria and A Soul's Tragedy*, which closed the series of *Bells and Pomegranates* in 1846, were designed and written as plays of the study. Browning's experience of the stage was not fortunate, for *A Blot in the 'Scutcheon*



Robert Browning
Portrait by G. F. Watts, R.A.

led to a misunderstanding with one friend, and *Colombe's Birthday* estranged him from another.

Besides the dramas Browning had found time during those years for the obscure *Sordello*, 1840, as well as for a number of dramatic lyrics and dramatic romances. He had also made the acquaintance of the poet Elizabeth Barrett, whom he married on Sept. 12, 1846. They settled at Florence, and their home was the Casa Guidi until the death of Mrs. Browning in 1861 broke Browning's long connexion with Italy. He lived for a time in London, where he went a good deal into society, and did not return to Italy until 1878. His last days were spent at his son's home in Venice, and there he died, Dec. 12, 1889. He was buried in the Poets' Corner, Westminster Abbey, on the last day of the year. His knowledge of Italy, attested by

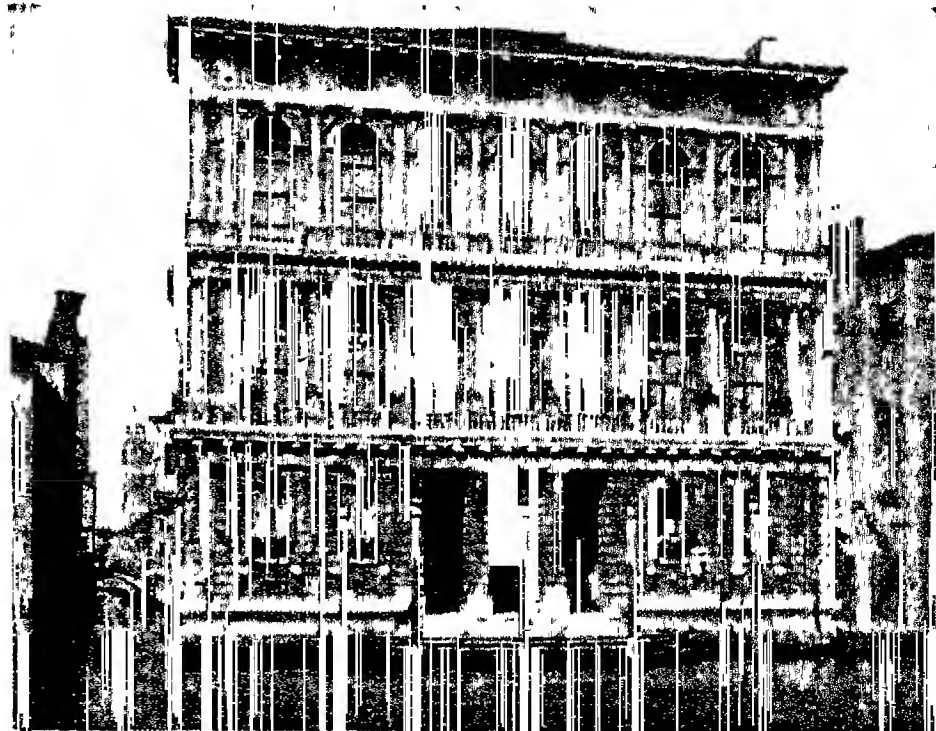
several of his greatest poems, was profound: Dante Rossetti declared that Browning's knowledge of early Italian art was "encyclopaedically beyond that of Ruskin himself."

After his wife's death Browning made his home in London, and gradually assumed a position of prominence in literary circles. Although fame came late, he was at last recognized as the rival of Tennyson himself among the poets of the Victorian era, while some held him to be the greater of the two.

The twenty-two years which followed his marriage may be called Browning's central period; and it was his greatest. With much that was excellent in the work he did before 1846 there was mingled not a little that was more or less experimental: and after *The Ring and the Book* the artist was often lost in the philosopher. Never was Browning so uniformly great as in the years which saw the publication of *Christmas Eve and Easter Day*, 1850; *Men and Women*, 1855; *Dramatis Personae*, 1864, and *The Ring and the Book*, 1868-69. After the last named, the greatest of his works, Browning had still twenty years to live, and he worked to the end. By a striking coincidence *Asolando* was published on the day on which he died, and the well-known *Epilogue*, which breathes his very spirit, was his last utterance to the world.

All through the numerous volumes during those last twenty years there were utterances worthy of Browning at his best. But the general level is distinctly lower than that of the preceding period. *Pacchiarotto*, 1876; *Dramatic Idylls*, 1879-80; *Jocoseria*, 1883; *Ferishtah's Fancies*, 1884; and *Parleyings with Certain People*, 1887, are by no means equal to the kindred volumes of earlier years.

In spite of their charm, few would place the two volumes based



Browning. Palazzo Rezzonico, the house on the Grand Canal, Venice, where Robert Browning died, Dec. 12, 1889

upon the Greek dramatists, Balaustion's Adventure, 1871, and Aristophanes' Apology, 1875, quite in the first rank of Browning's writings; and the majority would admit that Prince Hohenstiel-Schwangau, 1871, and Red Cotton Night-Cap Country, 1873, are marred by a kind of perversity: that The Inn Album, 1875, in spite of its power, is repellent, and that Fifine at the Fair, 1872, is altogether too metaphysical. This is perhaps also a defect of La Saisiaz 1878; but this poem, in addition to its inherent beauty, has, like Asolando, the peculiar interest that it expresses, not dramatically but directly, Browning's thoughts on the fundamental problems of life. While, therefore, the closing period is artistically inferior to the central period, it is near the end that we find the best evidence of what the poet in his maturity really thought.

Bibliography. The Browning Cyclopaedia, E. Berdoe, 1892; The Poetry of Browning, Stopford Brooke, 1902; Browning, Background and Conflict, F. R. G. Duckworth, 1931; Letters, ed. T. J. Wise, 1933; Lives, G. K. Chesterton, 1903; Griffin and Minchin, new ed., 1938; J. M. Cohen, 1954.

Browning Gun. An automatic gun named after J. M. Browning (1854-1926), U.S. inventor, used as an infantry weapon or A.A. weapon for engaging dive-bombers and low-flying aircraft. It is also a standard defensive weapon fitted in the gun turrets of British bombers. The gun weighs 21 lb. 14 oz. and its length with flash eliminator is 3 ft. 8½ ins. It is recoil operated, assisted by the gases generated by the explosion of the cartridges, and fires .300-in. or .303-in. small-arms ammunition at the rate of 1,150 rounds per minute. The Browning's five grooves have right-hand rifling and a twist of 1 in 10: it is cooled by the air flow over the barrel, muzzle attachment, and flash eliminator. For anti-aircraft purposes it is mounted singly or in twin or quadruple. A later version of the gun fires 0.5-in. ammunition.

Browning Settlement. London institution for the social and intellectual betterment of the poor. Founded in 1895, in York Street, Walworth, S.E., by members of the Congregational chapel in which Robert Browning was baptized, it aims specially at the union of labour with undenominational Christianity. Special attention is given to housing and similar problems, and to education both by study and by travel.

Brownists. Name adopted by the followers of Robert Browne (*q.v.*) in 1581. The first separatists from the Church of England, the Brownists decided that in making each congregation an independent self-governing religious unit they were following the model laid down in the New Testament. At the beginning of the 17th century the Brownists were Independents, and openly antagonistic to the Presbyterians at the Commonwealth. Later they adopted for their denomination the name of Congregationalism (*q.v.*).

Brown-Potter, CORA URQUHART (1859-1936). Anglo-American actress. The daughter of David



Cora Brown-Potter,
actress
Lallie Charles

Urquhart, she was born in New Orleans, May 15, 1859. She made her first professional appearance on the stage at Brighton in March, 1887 playing Faustine de Bressier in Civil War.

and a few days later appeared for the first time in London. Later in the year she returned to the U.S.A. and played with Kyrle Bellew, appearing as Juliet, Kate Hardcastle, Rosalind, and in other leading parts. She toured through India, Australia, and China, and in 1892, was again playing in London, this time as Hero. In 1898 she played Charlotte Corday, after which she was associated with Beerbohm Tree at Her Majesty's and at the Haymarket. In 1904, just after she had been divorced from her husband, a New Yorker. Mrs. Brown-Potter took over the management of the Savoy. Later she went on the music-hall stage, and, after a period of touring, returned to America. In 1912 she appeared again in London in Buddha at the Court Theatre; and she retired after a benefit matinée at Guernsey in 1919. She died on the Riviera Feb. 12, 1936.

Brownsea OR BRANKSEA. Island in the entrance to Poole Harbour, Dorset, England. A small fortress was built here by Elizabeth I and strengthened by Charles I. Under the ownership of Colonel Wauch, potter's clay was worked, a pier built, and the church of S. Mary founded for labourers. The castle was damaged by fire in 1896. On the island in 1907 was held the first camp of the Boy Scouts (*q.v.*).

Brown - Séquard, CHARLES ÉDOUARD (1817-94) French-American physician and physiologist. He was born in Mauritius, April 8, 1817, of an American father and French mother. He qualified in medicine in Paris and from 1859 to 1863 was physician to the Hospital for the Paralysed and Epileptic in London. In 1863 he was appointed professor at Harvard university. Returning to France in 1869, he was elected in 1878 to the chair of medicine at the Collège de France. He died in Paris, April 1, 1894. He investigated the conditions and functions of the constituents of the blood animal heat, the spinal cord, the brain and nervous system, and sympathetic nerves and ganglia.

Brown's Furnace. Roasting furnace with a fixed hearth on which the ore is raked by means of rabbles or rakes operated mechanically. It is extensively employed in America, and is now generally built in a straight line. The rabbles, after passing through the furnace, are carried on rails over the top of the arch or under the bed to cool, and then pass once more through the furnace. A each side of the hearth is a narrow chamber separated from it by fire-tiles projecting downwards from the roof and upwards from the hearth, having a narrow horizontal slot between them. The rabble arms carrying the rakes are supported at the ends of small carriages, the latter being drawn by an endless steel rope and being run in one chamber on a rail and in the other on a flat track. The furnace ranges from 60 to 180 ft. in length, and is 10 ft. wide.

Brownshirts. Popular name for the Sturm Abteilung (S.A.), or Storm Troopers, a semi-military body inside the Nazi movement in Germany. See Hitler: National Socialism.

Brownsville. A city and port of entry of Texas, U.S.A. The seat of Cameron co., it stands on the Rio Grande, opposite Matamoros, Mexico, and is well served by rly. It is important as a junction of communications by land, sea, and air between the U.S.A. and N.E. Mexico; as the marketing and processing centre for the produce of the Rio Grande valley; and as the terminus of the Gulf Intracoastal Waterway, completed 1949. The last engagement of the American Civil War took place near by, May 13, 1865. Pop. (1950) 36,066.

Brown Willy. Highest summit of Cornwall, England, about 10 m. N.E. of Bodmin. Its alt. is 1,375 ft.

Broxburn. Quoad sacra parish and town of W. Lothian, Scotland. It is 11 m. W. of Edinburgh, on the railway, and is noted for its shale-oil works.

Broz, JOSIP. Original name of the Croatian partisan leader who in 1943 became famous as Tito (*q.v.*).

Bruay-en-Artois. Town of France, in the dept. of Pas-de-Calais, 6 m. S.W. of Béthune. It is a centre of the chief coal-mines of Pas-de-Calais. Pop. (1954) 31,923.

Bruay-sur-l'Escaut, in the dept. of Nord, lies near the Belgian frontier. It has coal mines, iron foundries, and glass factories. Pop. (1954) 10,493.

Bruce, CHARLES GRANVILLE (1866–1939). British soldier and explorer. Son of the 1st Lord Aberdare, he served in the First Great War in Egypt and at the Dardanelles, being afterwards G.O.C. the N. Waziristan Force. He retired in 1920. He explored the Himalayas, and was chief of the Mount Everest Expeditions of 1922 and 1924. He published *The Assault of Mount Everest*, 1923; *Himalayan Wanderer*, 1934. He died July 12, 1939.

Bruce, EDWARD (d. 1318). King of Ireland. The younger brother of Robert I of Scotland (The Bruce), he fought for Robert in Scotland, routing the English in Galloway, and capturing Dundee in 1313. He led the right wing at Bannockburn in 1314, and was crowned king of Ireland at Carrickfergus in 1315. He was slain fighting the English near Dundalk.

Bruce, JAMES (1730–94). Scottish explorer. Born at Kinnaird, Stirlingshire, he was educated at Harrow. He

was consul at Algiers, 1763–65, after which he visited the historic ruins in Northern Africa. In 1770 he went to Abyssinia for about two years. He then went on his best known

journey, in which he reached the source of the Blue Nile, being the second European to visit it. Returning to England, he wrote an account in five volumes in 1790. He died from a fall, April 27, 1794. Consult *Life*, F. Head, 1844.

Bruce, ROBERT (1274–1329). King of Scotland, known as Robert I. He was grandson of the Robert Bruce who with John

Baliol and other candidates claimed the throne of Scotland in 1290, and the son of another Robert Bruce who married Marjorie, the daughter and heiress of the earl of Carrick. Through her the Bruces obtained the earldom of Carrick, the future king being known as earl of Carrick until his coronation in 1306. His father appears to have handed over this earldom to him in 1292, being himself called lord of Annandale.

The Bruces were a Norman family who were granted estates in Scotland. The claimant Bruce died in 1295; his son Robert, who took no part in the revolts against England, in 1304; the third Robert was the Scottish national hero. The date of his birth is usually given as July 11, 1274.

Robert appears to have fought with equal readiness on either side until in 1306 he decided to throw in his lot with the cause of Scottish independence. He proposed some kind of compact with his cousin John Comyn, but at a conference in the church at Dumfries the two quarrelled, and Bruce stabbed Comyn. Bruce, knowing that there could now be no pardon for him, flung down the challenge to King Edward and procured his own coronation as king of Scotland by the patriot party in March, 1306. He was defeated by the English and the Comyn faction at Methven, and passed the winter in hiding on the Irish coast, but early in 1307 he descended upon his earldom of Carrick with a band of supporters and drove out the English. Edward I marched against him with a great army, but died before he could enter Scotland. Edward II abandoned the expedition, and left the English officers in the N. to maintain their hold on Scotland.

Year after year Robert and the patriot nobles and knights, supported by the common folk, waged war upon the English, capturing and dismantling one stronghold after another. In 1314 Stirling was the only fortress remaining in English hands. At last Edward II led a large army into Scotland; but Robert Bruce, with a force one-third of his opponent's numbers, inflicted upon the English (June 24) an overwhelming defeat. Bannockburn decisively liberated Scotland from all fear of the re-establishment of the English supremacy. War continued during the next thirteen years, but it was waged on the English side of the Tweed, and in 1328 King Robert's title and the

independence of Scotland were recognized in the treaty of Northampton.

The great king died of leprosy June 7, 1329, at Cardross. His daughter Marjory married Walter the Steward, whose son Robert II was the first king of the Stewart dynasty. His own immediate successor was his young son David II. He had several other children, some being illegitimate. Bruce was buried at Dunfermline, but his heart was laid in Melrose Abbey, the attempt of Sir James Douglas to carry it to Jerusalem having been thwarted by his death when fighting the Moors in Spain. See *Bannockburn, Battle of Edward I*; consult also *Lives*, A. M. Mackenzie, 1934; E. Linklater, 1934; E. Bigland, 1937.

Bruce OF MELBOURNE, STANLEY MELBOURNE BRUCE, VISCOUNT (b. 1883). Australian politician.

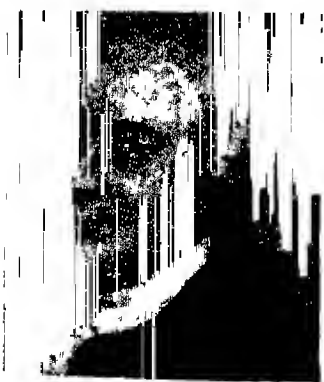


Viscount Bruce, Australian politician

Born April 15, 1883, he attended Melbourne grammar school and Trinity Hall, Cambridge, rowing in the Boat Race, 1904. Service in the First Great War preceded his election to

the Australian parliament in 1918. Prime minister 1923–29, he represented Australia at the imperial conferences in London, 1923, 1926, 1937, and at Ottawa, 1932; and at the world economic conference, 1933. He was high commissioner in London from 1933 to 1945, and in 1942 also became Australian minister to the Netherlands government. He was appointed chairman of the International Emergency Food Council in 1946, and in 1947 of the finance corporation for industry (U.K.). On the opening of Canberra in 1927 he was made C.H., and in 1947 a viscount.

Bruce, WILLIAM SPEIRS (1867–1921). Scottish explorer and scientist. Born at Edinburgh, Aug. 1, 1867, he went to the university. He accompanied the Scottish Antarctic expedition, 1892–93, and the Jackson-Harmsworth Arctic expedition, 1896–97. In 1908 he led the Scottish Antarctic expedition, discovering 150 m. of coast line in Antarctica. He published the scientific results of his voyages. Between his journeys he was lecturer on geography at the Heriot-Watt College, Edinburgh. He was



James Bruce, Scottish explorer
From an engraving
by Freeman

director of the Scottish Oceanographical Laboratory, and died Oct. 28, 1921.

Brucea. Genus of evergreen shrubs, members of the family Simarubaceae. Natives of Asia and Africa, some of them possess bitter properties akin to those of the allied quassia. They have leaves divided into opposite leaflets and small purplish flowers in spikes or sprays.

Bruch, MAX (1838-1920). German composer. He was born of Jewish parents at Cologne, Jan. 6, 1838. The first production of his opera Lorelei was at Mannheim in 1863, after which he wrote choral works, including the Frithjof Scenen for male voices and orchestra. By these Bruch expected to be remembered, but modern audiences know better the violin concerto in G minor, with its lyrical slow movement, the Romance for violin and orchestra, and the Kol Nidrei variations for cello. He held many posts as musical director, including that of Liverpool Philharmonic Society, 1880-83. He died Oct. 2, 1920.

Bruchsal. Town of Baden, Germany. On the Saalbach, 14 m. by rly. N.E. of Karlsruhe, it is an important rly. junction, with manufactures of paper, soap, and candles. It has a trade in wine. Pop. (est.) 20,000.

Brucine. Alkaloid which occurs with strychnine in the seeds of *Strychnos nux vomica* and *Ignatia amara* or S. Ignatius' beans. Pelletier and Caventou discovered brucine in 1819, the year after they had isolated strychnine. *Nux vomica* seeds contain about 1.25 p.c. of brucine, S. Ignatius' beans about 0.5 p.c. Chemically brucine is dimethoxy-strychnine. It is prepared from the mother-liquors obtained in the manufacture of strychnine, from which it is separated by means of oxalic acid or acetone. Brucine resembles strychnine, but is more soluble in water and less poisonous. The most characteristic chemical test for brucine is the red colour it gives with nitric acid; this, after warming, is turned violet by the addition of stannous chloride. See Strychnine.

Brucite. Mineral composed of hydrated magnesium oxide, and named after the New York mineralogist, A. Bruce. It is white, but subordinate iron

and manganese oxides impart blue or brown tints. The crystals are rhombohedral. It is a secondary mineral, and large deposits may be formed in metamorphosed limestones and dolomites. Brucite is used, especially in Canada, for the production of metallic magnesium and magnesia.

Bruckner, ANTON (1824-96). Austrian composer. Born at Ansfelden, Upper Austria, Sept. 4, 1824, he began as a music teacher. He was appointed organist to Linz cathedral, and while studying at Vienna wrote nine symphonies (the last being unfinished), a magnificent Mass in F minor, and a Te Deum in C major. There is a strong religious feeling throughout all his compositions.

Brueghel. Surname of a family of painters of the Low Countries. Pieter (1525-1569), called Pieter Brueghel the Elder, was born in the village of Brueghel (mod. Breugel), near Breda in N. Brabant, the son of poor parents of peasant stock. Except for a short sojourn in Italy in 1551, he spent his life in Antwerp and Brussels, to which he removed on his marriage in 1563, and where he died. Influenced by Hieronymus Bosch in his youth, he painted village feasts and rustic gatherings (hence the nickname "Peasant" Brueghel) with humour and brilliance, using lively tones placed side by side without transition, and bright colours on a background of snow. His palette has a richness of tone unknown till then, and his later paintings show a naturalistic manner. Many of his

pictures, ostensibly of biblical subjects, e.g. The Massacre of the Innocents, in fact represent the persecution of his countrymen by the Spaniards. Of his pictures in this vein R. H. Wilenski wrote, "No ghastlier indictment of an epoch has ever been set down by the hand of man." There are pictures by Pieter the Elder in most European galleries. (*Consult* Lives. V. Barker, 1928; G. Gluck, 1937; Details from P. B.'s Paintings, ed. G. Gluck, 1936.)

Brueghel's elder son, Pieter the Younger (1564-1637), called "Hell" Brueghel from his predilection for painting scenes of the nether regions, is inferior as a painter to his father. He worked most of his life at Antwerp. Christ Bearing the Cross, 1606, is a good example of his art.

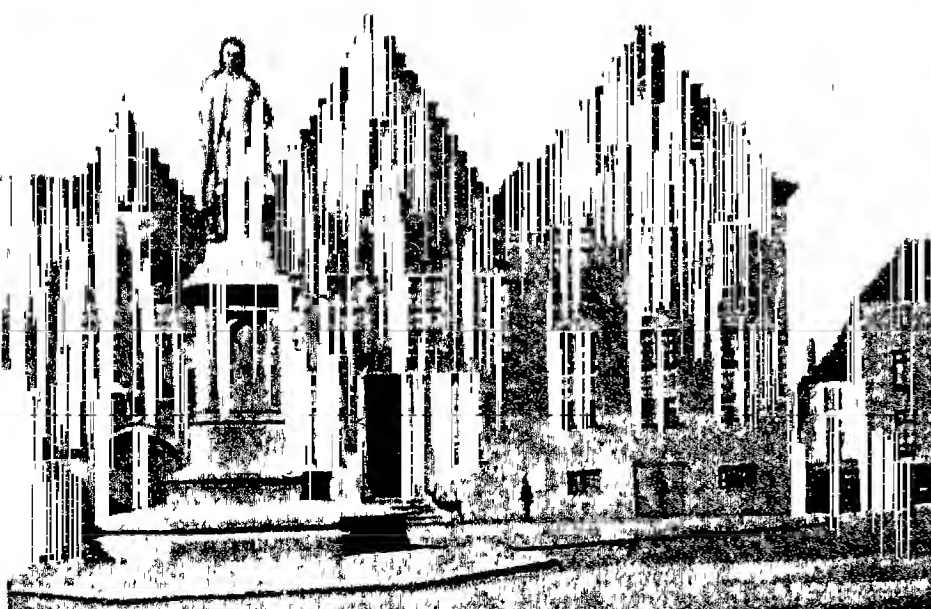
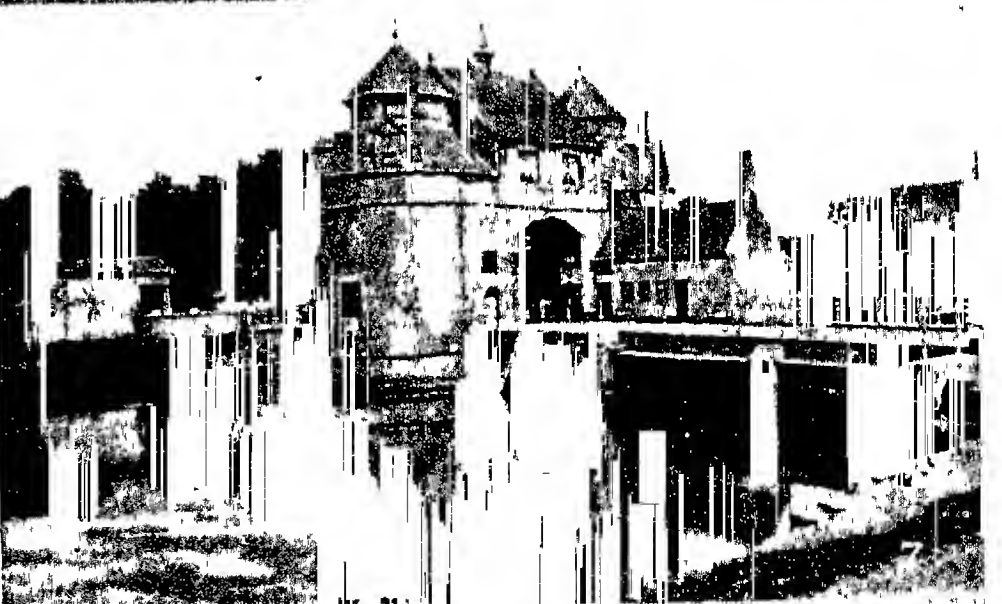
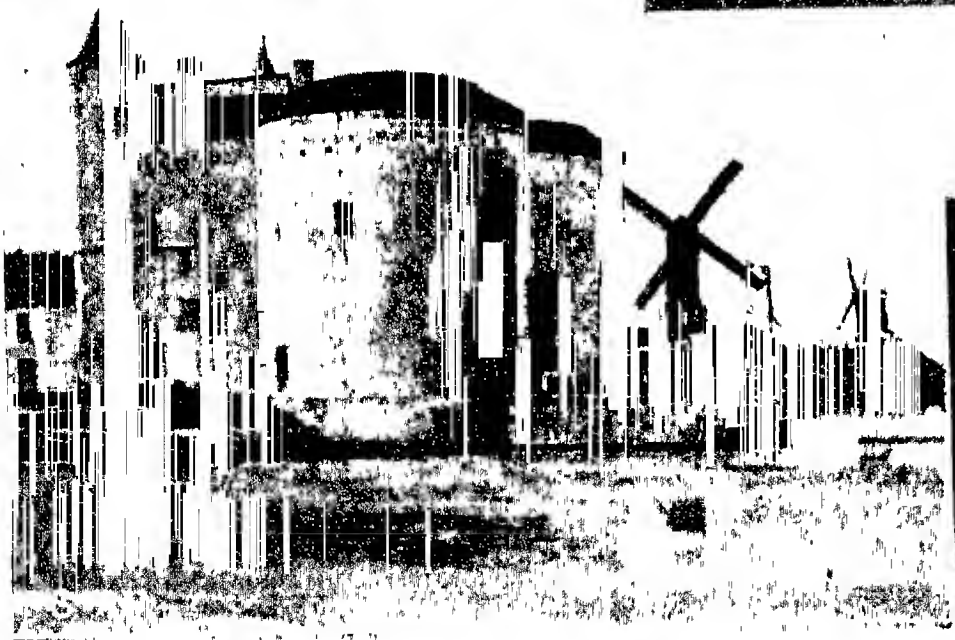
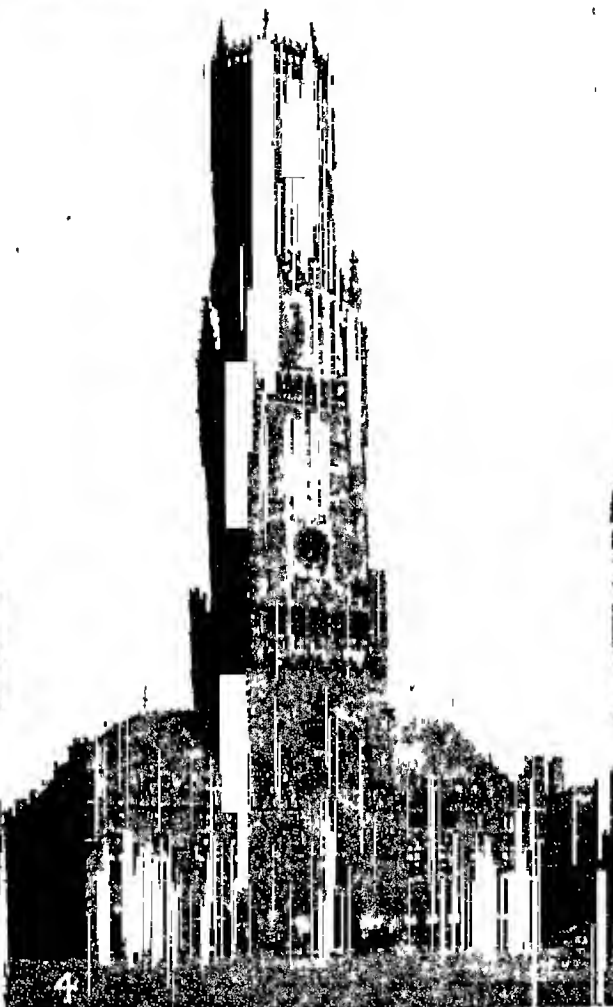
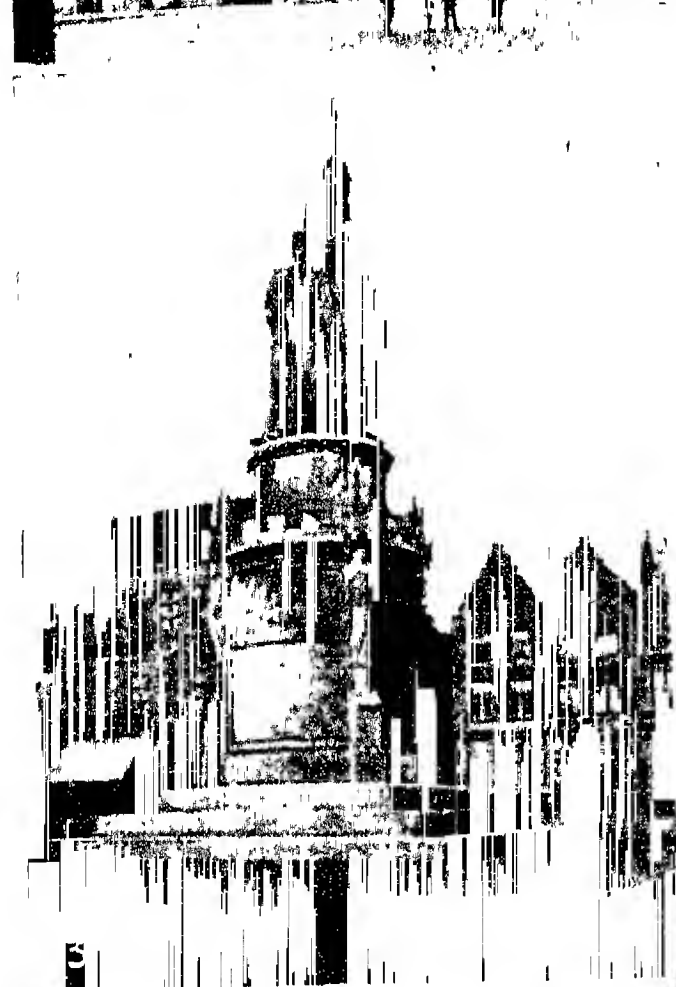
Jan Brueghel (1568-1625), younger son of Pieter the Elder, and known as "Fluwelen" (Velvet) Brueghel, was born in Brussels, and died in Antwerp. A friend of Rubens, who several times painted the figures in his landscapes, Jan had a poetic imagination. His colour is enamel-like, with velvety shades and deep bluish distances. Many of his works are small panels, the earlier studies of flowers and fruit, the later landscapes, in which he excelled. His son, Jan the Younger (1601-75), worked chiefly at Antwerp. His landscapes have frequently been mistaken for his father's, but his pictures lack the outstanding qualities displayed by the elder Jan. He is represented at Munich and Dresden.

Bruges (Flem. Brugge, bridge). City of Belgium, capital of the prov. of West Flanders. It was famous in the Middle Ages as the Venice of the North, and is still the most interesting city in Belgium to the artist and antiquary. It was named by Baldwin Bras de Fer, count of Flanders, about A.D. 860, and his son and successor built the first castle, and surrounded a small part of the present town with a wall. The church of S. Sauveur, and that of Notre Dame, then S. Boniface, dating respectively from the 7th and 8th centuries, lay to the W. of this castle and walled city. About the middle of the 10th century the cloth trade had become the staple industry of the place, and Baldwin III established regular markets and fairs. The Halles, with their famous belfry, represent the markets, while the fairs were held on the Grand Place.

The cloth trade brought prosperity to Flanders generally, and

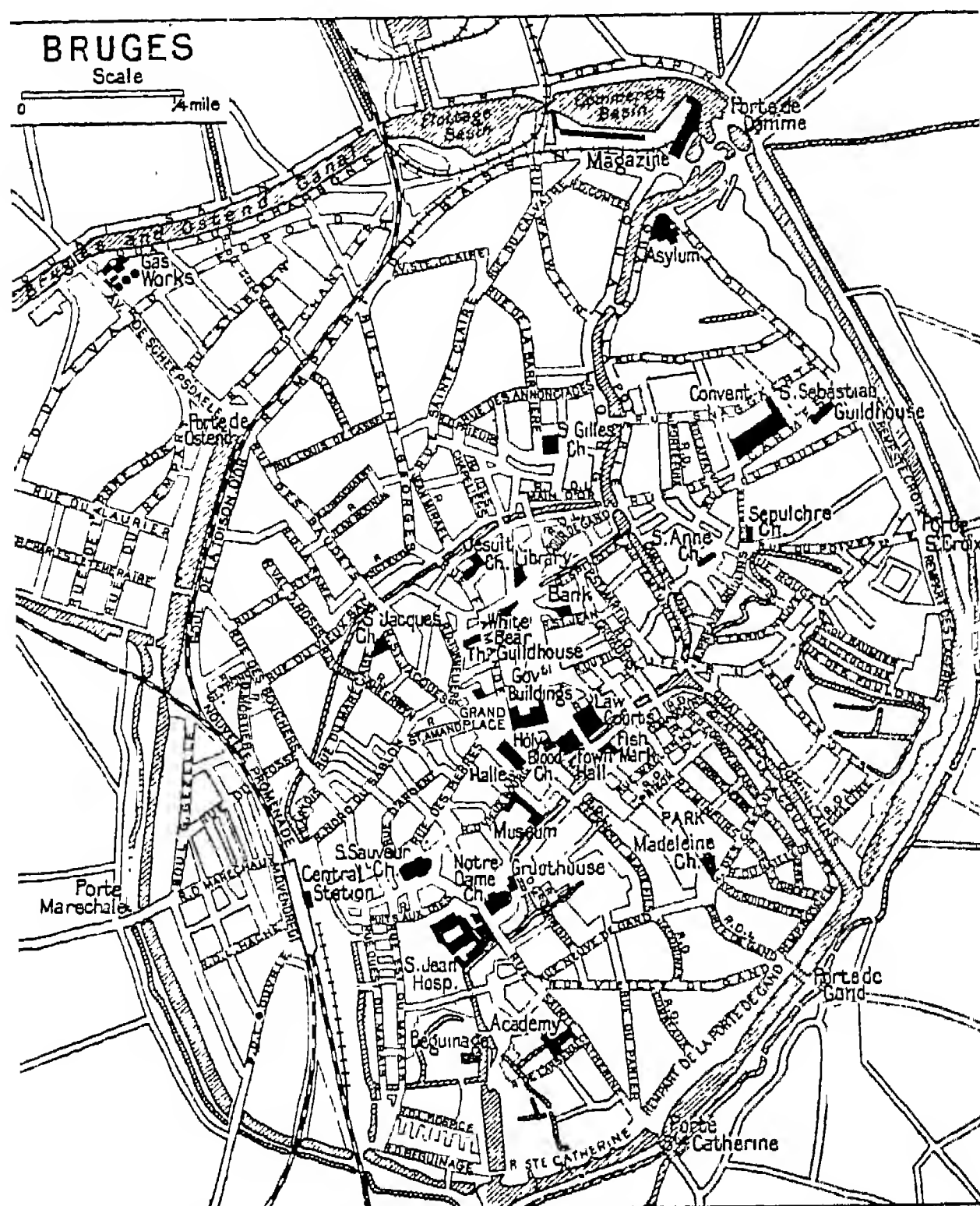


Brueghel. The Adoration of the Kings, by Pieter Brueghel the Elder
National Gallery, London



1. The Hôtel de Ville (Town Hall) and chapel of the Holy Blood. 2. The fishmarket. 3. Statue of Breydel and Coninck. 4. The Halles (markets), with the 13th century belfry tower in the Grand Place. 5. Academy of Fine Arts. 6. S. Croix gate. 7. Ostend gate. 8. Statue of Hans Memling. 9. The Béguinage

BRUGES: ARCHITECTURAL GLORIES OF THIS HISTORIC AND BEAUTIFUL CITY



Bruges. Plan of the Belgian city, which was once the chief commercial centre of W. Europe. Ocean-going vessels can reach it by canal from Zeebrugge and Ostend

notably to Bruges; the population multiplied, reaching a total of 100,000, and the artisans formed themselves into 56 guilds or fraternities. The various charters that constituted the freedom of Bruges and its dependent townlets, grouped together under the name of the Franc of Bruges, were conceded by the counts of Flanders in the 11th and 12th centuries. Bruges was, however, something more than an industrial centre; having access to the North Sea by the Zwyn, it was a port trading directly with England and the Mediterranean countries. It was also the financial metropolis of Western Europe, where the old cumbrous trade of barter was first superseded by the modern cash and credit system. This was the period when it was visited by Dante, who has immortalised the activity and prosperity of Flanders.

Bruges attained the height of its splendour under the house of Burgundy. In 1430 Philip the Good, to celebrate his marriage with Isabel of Portugal, founded the Order of the Golden Fleece. The chapters of the order were held in the cathedral, and the

stalls of the choir are still decorated with the armorial bearings of the 29 knights who took part in the chapter of 1478. But by that date the decline of Bruges had already become marked; the Zwyn was sand-blocked, and the trade centre of the Netherlands shifted to the city of Antwerp.

Though her prosperity had departed, time and adversity could not deprive her of her ancient charm. Within her narrow compass were some of the most stately, original, and unsurpassable buildings in the world, containing some of the treasures of Europe. Among these may be named the cathedral of S. Sauveur, distinct from the first cathedral of S. Donat of the Crusades ; the church of Notre Dame, famous for the tombs of Charles the Bold and his daughter Mary ; the churches of S. Gilles, of the Sepulchre, S. Anne, and the Madeleine and the chapel of the Holy Blood. The hospital of S. Jean, for the aged and infirm, dating from the 12th century, is celebrated for its artistic contents, which include the famous shrine of S. Ursula, the panels being among the masterpieces of Hans Memling. Close to

it is the Béguinage, founded by Joan of Constantinople in the 12th century. Among secular buildings the Halles, the Town Hall, the Gruuthuuse, the House of the Franc, the S. Sebastian guildhouse, the White Bear guildhouse, and the weighing house are remarkable.

Since the formation of the modern kingdom of Belgium, Bruges has taken on a fresh lease of prosperity. It has many industries, and the ship-canal to Zeebrugge made it once more a seaport. During the First Great War it was captured by the Germans Oct. 14, 1914, and remained in their possession until reoccupied by Belgian infantry Oct. 18, 1918; its U-boat base was frequently bombed by Allied airmen. German troops occupied it May 29, 1940, the day after Belgium's surrender in the Second Great War. On Sept. 12, 1944, troops of the 1st Canadian army liberated an almost undamaged town. The Town Hall was damaged by fire Oct., 1946. The pop. declined between the wars and in 1947 was 52,748.

Brugg or **BRUCK**. Walled town of Switzerland, in canton Aargau. It is on the Aar, commanding the bridge near the confluence of the Reuss and Limmat, 36 m. by rly. E. of Basel. A picturesque place, with conical towers, it stands partly on the site of Vindonissa (Windisch), the chief Roman station in Helvetia. Near by is the ruined castle of Hapsburg, the cradle of the Austrian imperial family, members of which are buried in the neighbouring monastery of Königsfelden, now a mental hospital. Brugg has chemical, silk, and other industries. Pop. (1941) 4,778.

Brugsch, HEINRICH KARL (1827--94). German Egyptologist. Born in Berlin, Feb. 18, 1827, he published a treatise on demotic writing at 21, and went to Egypt in 1853. He helped Mariette to excavate Memphis, was appointed consul in Cairo in 1864, and director of its school of Egyptology in 1870. In 1881 he became Brugsch Pasha. He went on missions to Persia in 1863 and 1895. Among his publications are a hieroglyphic-demotic dictionary, 1867-82; and a history of Egypt under the Pharaohs. 1877. He died Sept. 9, 1894.

Bruise. Injury due to rupture of a blood-vessel beneath the skin causing bleeding into the tissues. When the bleeding is situated deeply in the tissues it may be some days before the bruise comes out. A blow on the upper part of the arm may be followed by a bruise on the elbow, the blood having

travelled down beneath the tissues before reaching the surface. A blow on the skin immediately over a bone such as the shin is apt to cause more extensive bruising than one on a soft part such as the abdomen, where the underlying structures act as a cushion and prevent the blood-vessels from rupturing. Haemorrhage producing all the appearance of a bruise may result from certain diseases, or from a violent fit of coughing.

Women bruise easily during and after the change of life. The withdrawal of the ovarian secretion from the blood-stream alters the calcium chemistry of the body, and, indirectly, the character of the capillary walls, allowing easier escape of blood. A shortage of vitamin C increases the permeability of the vessel walls and leads to easy bruising.

Healthy blood-vessels should take a pressure of 80° of mercury on the sphygmomanometer without bruising—a fact that is used as a test of normality. The change of colour in a bruise as it fades is due to chemical change in the haemoglobin of the extravasated blood.

Brumaire (Fr., month of fog). Second month in the year in the French Revolutionary calendar. It began in some years on Oct. 22, in others on Oct. 23. On 18 Brumaire, 8 (Nov. 9, 1799), Napoleon abolished the Directory. See under Calendar.

Brummell, GEORGE BRYAN (1778–1840). A British dandy, known as Beau Brummell. Born in London, June 7, 1778, the son of Lord North's private secretary, he went to Eton in 1790 and after a few months at Oriel College, Oxford, obtained in 1794 a commission in the 10th Hussars. In



Beau Brummell,
British dandy

1798 he left the army, and in 1799 came into an inheritance of £30,000, and set up as a man of fashion. Backed by the Prince Regent, his own unerring taste in dress, and his superb self-possession, he quickly became recognized as a social dictator. Having quarrelled with his patron and run through his fortune, he fled to France in 1816 to escape his creditors. During 1830–32 he was British consul at Caen, and in 1835, after being imprisoned for debt, he was pensioned by his friends. In 1837

he was admitted to Bon Sauveur asylum, Caen, where he died, March 30, 1840. *Consult* Life, V. Woolfe, 1930.

Brunanburh. Site of King Athelstan's famous victory, 937, over a powerful alliance of Scots, Danes from Dublin, Norwegians from Cumbria, and Britons of Strathclyde. The name is variously spelled and there is doubt about the locality; it may be in Dumfriesshire, near the Roman camp called Birrens; or in Yorkshire, between Sheffield and Rotherham; other less likely localities have been suggested. The metrical story of the battle in the Anglo-Saxon Chronicle tells that it was fought from dawn to sunset, and that five of the allied kings and seven of their earls fell.

Brunei. A British protected state in N.W. Borneo, East Indies. Lying between the British colonies of Sarawak and North Borneo, it has a coastline on the South China Sea running some 100 m. from Kuala Belait (10 m. W. of Seria) in the W. to Brunei Bay in the E.; area 2,226 sq. m. Flat along the seaboard and rising to low hills inland, it is thickly wooded with over 900 sq. m. scheduled as forest reserves: there are numerous small rivers of which the chief is the Limbang. The climate is tropical, with very heavy rainfall Oct.–Jan. Rubber is cultivated and exported; rice, sago, and coconuts are grown for local consumption and there are considerable fisheries; silverware is made. Oil was discovered at Seria, 1929, where the field extends 10 m. along the coast and 1½ m. inland, with offshore wells drilled from piers; underwater drilling from platforms 1 m. out to sea began 1954. Production rose from 700,000 tons in 1938 to 5,000,000 tons in 1954. From Seria, the oil is piped 35 m. to the Lutong refinery, Sarawak. Cross-country roads are few and internal transport is mainly by river launch.

Apart from trading associations with China and Java, the early history of Brunei is not known, but at the beginning of the 16th century it was visited by Portuguese, Spanish, and British navigators (see under Borneo). In 1847 the sultan entered into treaty relations with Great Britain, and the state was taken under British protection 1888. Brunei was occupied by the Japanese 1941–45; it suffered severe damage, including destruction of the oil installations. Authority in the state is vested in the sultan-in-council: the state council (12 members) includes a British

resident acting as adviser, to whom four district officers are responsible. The Sarawak-N. Borneo-Brunei conference, a standing body set up in 1953, promotes cooperation between these territories. Brunei Malays and Dyaks are the principal native peoples; there are many Chinese immigrants. Pop. (1952 est.) 49,620.

The capital, also called Brunei, is the chief town; it lies 9 m. from the mouth of the r. Brunei, and comprises groups of Malay houses erected on piles on mud flats in the river and (since 1910) a township built on the land, partly reclaimed; here are wharves accommodating vessels of up to 1,700 tons, govt. and public buildings, hospital (opened 1951), schools, and shops, with piped water and electricity. Steamers connect with Singapore (759 m.) and a weekly launch service with Labuan (N. Borneo). The town, badly damaged by bombing in 1944, has an airfield. Pop. (1947) 10,620.

Brunel, ISAMBARD KINGDOM (1806–59). British engineer. Born at Portsmouth, April 9, 1806, the only son of Sir Marc Isambard Brunel (v.i.), he was educated at Brighton and Paris. In 1823 he began his career as assistant to his father in the construction of the



Isambard K. Brunel,
British engineer

Thames Tunnel. Appointed in 1833 engineer of the G.W.R., he adopted the 7 ft. gauge. He designed Clifton suspension bridge (not completed in his lifetime).

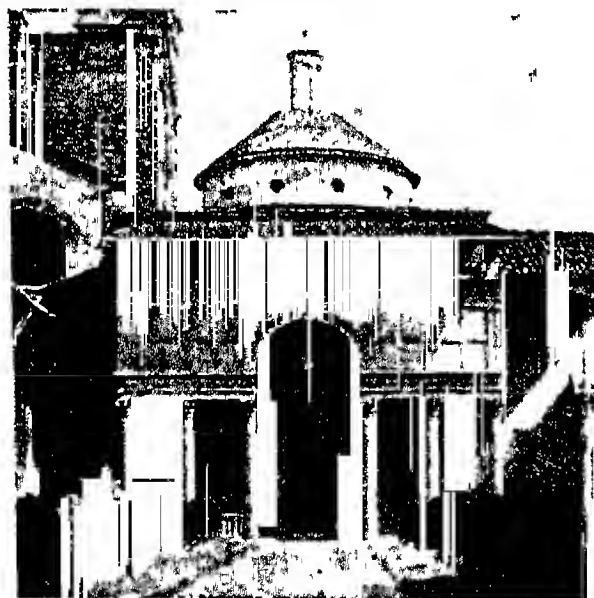
As a marine architect he designed in 1845 the Great Britain, the first ocean-going screw-steamer, and the Great Eastern (q.v.), 1853–1858. Among the docks he constructed were those at Monkwearmouth, Bristol, Plymouth, and Briton Ferry (S. Wales); he also designed Milford Haven pier. He died Sept. 15, 1859. A bronze statue of him stands on the Victoria Embankment, London, at its W. junction with Temple Place.

Brunel, SIR MARC ISAMBARD (1769–1849). French-born engineer who worked chiefly in England. He was born at Hacqueville, near Gisors, April 25, 1769, and entered the French navy; but his royalist sympathies compelled him to leave France and he went to New York, 1793. At first a surveyor and later an architect, he was appointed engineer of New York city, where

he devoted his attention to the improvement of the city's defences. In 1799 he visited England, and shortly afterwards put before the British Admiralty a contrivance for making ships' blocks. The machinery was installed at Portsmouth in 1803. His greatest work was the building of the Rotherhithe Tunnel opened 1843, on which he started work 1825. The strain brought on paralysis, and he died Dec. 12, 1849.

Brunel's inventions included improvements in printing, in the making of boots and shoes, and a knitting machine. He was responsible for the construction of floating landing piers and other improvements at the Liverpool docks. He was knighted 1841.

Brunelleschi, FILIPPO (1377-1446). Italian architect. He was the pioneer of the revival of the Classic style of architecture. Born at Florence, he first practised as a goldsmith, and then as a sculptor. Deciding to become an architect, he studied at Florence and in Rome, and, returning to Florence in 1417, was commissioned to roof the unfinished cathedral with a dome. The work was begun in 1420 and completed in 1461. The dome, resting on its vast octagon, is one of the greatest achievements of its kind. (See Florence illus.)



Brunelleschi. Capella dei Pazzi, Florence, begun 1420, an example of this Italian architect's work

He was employed on many other churches in Florence, *e.g.* those of S. Lorenzo and Spirito Santo, on the Capella dei Pazzi, and on the Pitti palace. He died at Florence, April 16, 1446, and is buried in the cathedral.

Brunetière, FERDINAND (1849-1906). French literary critic. Born at Toulon, July 19, 1849, he began to write in 1875 for the *Revue des Deux Mondes*, of which he became editor in 1893. A few years earlier he had been appointed professor at the *École Normale*. Collections of his critical essays and lectures, especi-

ally after he became a Roman Catholic in 1896, were marked by a definite conviction that art must be subordinated to morality, and that the theory of art for art's sake and the teaching of the naturalistic school of writers, represented by Zola, were false.

His many works include *Études Critiques sur l'Histoire de la Littérature Française*, 1880-1907 (in eight series); *L'Évolution des Genres dans l'Histoire de la Littérature*, 1890; *Essais sur la Littérature Contemporaine*, 1892-95; and *Manuel de l'Histoire de la Littérature Française*, 1898. He died Dec. 9, 1906.

Bruneval. Small fishing village 12 m. N. of Le Havre, Normandy, and site of a German radiolocation centre in the Second Great War. On the night of Feb. 27-28, 1942, Bruneval was the scene of a successful 2-hour operation by British forces. Parachute troops were dropped from bombers, while units of the Royal Fusiliers and the South Wales Borderers, covered by light naval craft, landed on the beach. The radiolocation station was destroyed and prisoners were taken. No British men, ships, or aircraft were lost. Gen. de Gaulle laid a stone to commemorate the raid, 1947.

Brunhild OR BRUNHILDA. Most famous of the Valkyries or warrior maidens of Norse mythology. Placed by her father Odin (Wotan) on a fire-girt rock, she lay in spell-bound sleep until the hero, Sigurd, rode through the flames and woke her. Faithless to his plighted troth, Sigurd afterwards helped Gunnar, the king's son of Rhineland, to win Brunhild by a cunning ruse and claimed as reward the hand of Gudrun, Gunnar's sister. When Brunhild learnt, through Gudrun's jealous tongue, of Sigurd's deed, she plotted his death, and, her vengeance accomplished, threw herself on his funeral pyre. So runs the *Volsung Saga*.

In the *Song of the Nibelungs* Siegfried, the hero, dons the Tarnkappe, which makes him invisible, and wins Brunhild for Gunther of Burgundy by conquering her in many trials of strength. Siegfried's wife, Kriemhild, betrays the trick, a quarrel ensues between the two women, and Brunhild brings about his death.

In Wagner's cycle of four music dramas of the *Ring of the Nibelungs*, Brunhild, daughter of Wotan and Erda, is the heroine of *The Valkyrie* (*Die Walküre*), the second opera. She protects Siegmund against Hunding in defiance of

Wotan, and Wotan leaves her asleep on a bed of moss surrounded by a wall of fire. At the end of Siegfried, the third opera, Siegfried, son of Siegmund, boldly faces the flames and wins Brunhild. In the last opera, the *Twilight of the Gods* (*Die Götterdämmerung*), Brunhild, losing Siegfried by a potion which makes him faithless, finally dies with his dead body on the funeral pyre. (See *Valkyrie*.)

An historical Brunhild was the Visigothic princess who married Sigebert, King of Austrasia, and was killed in 613.

Bruni OR BRUNY. Island of Tasmania, Australia, lying off the S.E. coast, between Storm Bay and D'Entrecasteaux Channel. Nearly divided in two at its centre, it is 32 m. long, from 1 to 11 m. broad; area 150 sq. m. A heavily-timbered ridge of mountains, rising to 2,000 ft. at Mt. Bruni, extends N. along the E. part of S. Bruni. The pastoral north produces fine sheep and wool, the south fruit; sawmilling and fishing are carried on.

Brüning, HEINRICH (b. 1885). Last constitutional chancellor of the first German republic. Born at Münster, Nov. 26, 1885, son of a merchant, he studied philosophy and languages in Germany, France, and Great Britain; commanded a machine-gun company on



Heinrich Brüning, German politician

the western front in the First Great War; afterwards cooperated with the Berlin "apostle" Carl Sonnenschein, a Roman Catholic priest organizing charity; and was in 1921 appointed general secretary of the Christian Trade Unions' Association. In the Reichstag from 1924 as a deputy of the centre, he became chancellor, 1930. Brüning's cabinet had to contend with financial crisis, mounting unemployment, and the threat of open revolt from extreme left and right. It gained respect abroad, however. Reputed to have monarchist inclinations, Brüning yet tried constitutional methods and held an election, which brought the Nazis up from 12 seats to 107, and the Communists from 54 to 77.

Backed by the Reichswehr and the industrialists, tolerated by the Socialists, Brüning tried to compromise with Hitler in an anti-democratic bloc. He managed in 1932 to proscribe Hitler's uniformed forces. But weakened con-

fidence in the Weimar regime and intrigues by von Schleicher combined to check Brüning from settling the reparations problem. Hindenburg withdrew support, and Brüning resigned May 31, 1932. Forced to flee when Hitler assumed power, he went abroad and was subsequently appointed a professor at Harvard University, where he remained until in 1953 he accepted a chair of contemporary history at Cologne.

Brünn. German form of the name of the Czecho-Slovak town of Brno (*q.v.*).

Brunnen (Ger., well). Village and summer resort of Switzerland. It is on Lake Lucerne, 4 m. by rly. S. of Schwyz, on the St. Gotthard line. Here, after the battle of Morgarten, the deputies of Uri, Schwyz, and Unterwalden renewed, Dec. 9, 1315, the league of 1291, from which developed the Swiss confederation.

Brunner. Town of Grey co., South Island, New Zealand. It is on the river Grey, 8 m. E. of Greymouth, on the route to the Otira Gorge. It is a coalmining centre. Pop. (1951) 1,113.

Brunner, SIR JOHN TOMLINSON (1842-1919). British businessman and politician. Born Feb. 8, 1842, the son of a Swiss pastor who settled in Liverpool, he entered business life at the age of 15. After about ten years with a firm of alkali manufacturers at Widnes, he and Ludwig Mond established alkali works at Northwich in 1873 which developed into one of the largest works in the world making chemicals (*see* Imperial Chemical Industries).

In 1885 Brunner entered parliament as M.P. for the Northwich division of Cheshire, which he represented almost continuously until 1910. A pronounced Radical, and a strong opponent of expenditure on armaments, he was interested in education and was a benefactor of Liverpool University. He died July 1, 1919.

Bruno (c. 1030-1101). Saint and founder of the Carthusian order. Born at Cologne, he was canon and master of the episcopal school at Reims, 1057-75. Chancellor of the church of Reims 1075-80, he later went to Chartreuse, near Grenoble, and there, with half-a-dozen companions, founded the first monastery of the Carthusian order. Steadily declining all preferment offered him by the pope, he established a second monastery in Calabria, where he died on Oct. 6, 1101. Though he was never formally canonised, his cult

was authorised; his festival is kept on Oct. 6. He is the popular saint of Calabria.

Bruno (c. 925-965). German prince-bishop and saint who was equally conspicuous for his justice as a ruler and his encouragement of learning. He was the youngest son of the German king Henry I, the Fowler, and brother of the emperor Otto I, the Great. He became chancellor in 940 and archbishop of Cologne in 953. Steadily faithful to Otto, for whom he governed Lorraine, Bruno was a great force for conciliation in the troublous times in which he lived. He died at Reims, Oct. 11, 965. His feast is observed in the diocese of Cologne on Oct. 11.

Bruno, GIORDANO (1548-1600). Italian philosopher. Born at Nola, in Naples, he entered the Dominican order and was ordained, 1572. On ceasing to believe in Christianity he fled from Naples, 1576, and for many years led a wandering life. He was in England 1583-85, and was excommunicated by the Lutherans in Germany in 1587. Having returned to Italy, he was imprisoned at Rome for six years by the Inquisition, and was burnt at the stake Feb. 17, 1600. Denial of the divinity of Christ was one of the main charges against him. Bruno's view of the world was a revival of that of the Stoics—a naturalistic pantheism. *Consult* Lives, J. L. McIntyre, 1903; W. Boulting, 1916; *Ethics and the History of Philosophy*, C. D. Broad, 1951.

Brunsbüttel. Seaport of W. Germany, in Schleswig-Holstein. Lying on the N. bank of the Elbe estuary, 15 m. E. of Cuxhaven, it is the western terminus of the Kiel canal. With Brunsbüttelkoog, on the S. of the waterway, it had an est. pop. of 10,000 in 1955. The chief industries of the two ports are the manufacture of machinery, shoes, and textiles; and there are fish canneries.

Brunswick. City of Victoria, Australia. It is 4½ m. N. of Melbourne, of which it is a suburb. Potteries, iron-foundries, and sawmills provide the chief industries, and there are brickyards.

Brunswick. City and port of entry of Georgia, U.S.A. The co. seat of Glynn co., 65 m. S.S.W. of Savannah, it stands on St. Simon's Sound, an inlet of the Atlantic, and is served by the Southern and other rlys. It has a national quarantine station, shipyards, creosoting works, and shellfish canneries, and manufactures naval stores, wood pulp and plywood, clothing, and paint. The offshore islands are

holiday resorts. They include Jekyll Island, made a state park in 1947. Brunswick, founded 1771-72, received a city charter in 1856. Pop. (1950) 17,954.

Brunswick (German Braun-schweig). District of the *Land* of Lower Saxony, W. Germany, area 1,197 sq. m., pop. (1952 est.) 857,000. It is the larger part of the historic duchy of Brunswick (1,425 sq. m.) and is a fertile area, noted for asparagus; industrial products include potassium, lignite, iron, lead, silver, and copper ore, and there are tobacco and textile factories.

The duchy of Brunswick originated when the extensive lands of Henry the Lion, duke of Saxony, were broken up in 1181; it was part of the district Henry was allowed to keep, and in 1235 his grandson Otto was recognized as duke of Brunswick. In 1634 the family died out, and the duchy was divided between the two dukes of Lüneburg, also descendants of Henry the Lion. The duke of Lüneburg-Celle called his part of Brunswick Hanover, and among his descendants were the Hanoverian kings of England, sometimes called the house of Brunswick. The part of the original Brunswick to retain the name passed in 1634 to the other duke of Lüneburg; he and his descendants called themselves dukes of Brunswick-Wolfenbüttel, later simply of Brunswick.

In the 18th century the fortunes of Brunswick were closely bound up with those of Prussia. Napoleon included it in the kingdom of Westphalia, but it was recovered by Frederick William, who was later killed at Quatre Bras. Charles II was driven from the duchy by a revolution in 1830, and in 1831 was deposed. The duchy joined the German Confederation in 1815, the North German Confederation in 1866, the German Empire in 1871.

In 1866 Brunswick's future became an international question. The victory of Prussia over Austria had resulted in the seizure of Hanover, as an ally of Austria, by Prussia. Duke William of Brunswick was old and childless, and George V, king of Hanover, was his heir. Prussia was unwilling that he should succeed, and arrangements were made for a regency. William died in 1884, when George's son Ernest, duke of Cumberland, claimed the duchy. His claim was disallowed by the German Bundesrat, and Brunswick passed under the rule of a regent, a prince of Prussia. This lasted till 1913, when Ernest Augustus (1887-

1953), son of the duke of Cumberland, having married the daughter of the emperor William II, was allowed to become the ruling duke of Brunswick. The country became a republic in 1918 and had alternate Socialist and Liberal governments until the Nazis came to power in 1933.

Ernest Augustus's only son George, prince of Hanover, claimed British nationality in 1954 in virtue of an act of 1705 making all Protestant descendants of Sophia (*q.v.*), electress of Hanover, British by birth; the case went through the British courts to the house of lords, which recognized his claim in 1956. (No such claim could be made by a descendant born after the British Nationality Act of 1948 came into force.)

Brunswick. City of W. Germany, in the *Land* of Lower Saxony on the river Oker, 32 m. by rly. S.E. of Hanover. The old town, abounding in gabled houses with carved wooden fronts, is surrounded by parks covering the fortifications dismantled in 1800. The 12th century cathedral contains tombs of the founder, Henry the Lion, and his wife. The churches of S. Andrew, S. Martin, and S. Catherine dated from the same period; other buildings were the ducal palace, the 14th century town hall, and the 13th century cloth merchants' hall. The ducal museum had a fine collection of pictures, enamels, gems, and antique curiosities. Besides being a centre of the publishing trade, the city manufactured pianos, chemicals, preserves, textiles, motor cars, and machinery. In the 13th century Brunswick was one of the most important cities of the Hanseatic League; not till 1671 was it the ducal capital. During the Second Great War the U.S. 9th army entered it on April 11, 1945. Pop. (1954) 238,425.

Brunswick, CHARLES WILLIAM FERDINAND, DUKE OF (1735-1806) German ruler and soldier, who married Augusta, eldest sister of George III, and was the father of Queen Caroline, consort of George IV. Born at Wolfenbüttel, Oct. 9, 1735, he served with distinction in the Seven Years' War, and in 1780 succeeded his father, Duke Charles I. In 1792 he commanded the united forces of Austria and Prussia against the French at Valmy. He again took command of the Prussian army in 1806, and suffered a severe defeat at Auerstädt, Oct. 14, 1806. He died Nov. 10 from wounds received in the battle. It was in consequence of

its heavy losses at Auerstädt that the Brunswick regiment wore mourning dress and was called the Black Brunswickers. Napoleon annexed the duchy and added it to the kingdom of Westphalia.

His son, Frederick William (1771-1815), a bitter opponent of Napoleon, came to England in 1809. In 1813 he returned to Brunswick and raised a fresh army. He was killed at Quatre Bras, June 16, 1815.

Brunswick Black. Varnish for fire-grates and metal work. It consists of turpentine, pitch or asphalt, and linseed oil.

Brunswick Square. London square, N. of Guilford Street, W.C. It was built early in the 17th century on ground belonging to the Foundling Hospital, which stood on the E. side. Notable residents have included John Leech, B. W. Procter, and Anne Manning, author of *Mary Powell*.

Brunton, SIR THOMAS LAUDER (1844-1916). British physician. Born March 14, 1844, he graduated at Edinburgh in 1866. After studying in Vienna and elsewhere, he returned to England and as a consulting physician soon made a reputation. He was made a fellow and then vice-president of the Royal Society and was long consulting physician to St. Bartholomew's Hospital. In 1908 he was made a baronet. He wrote *Pharmacology and Therapeutics*, 1880; *The Bible and Science*, 1881; *Therapeutics of the Circulation*, 1908. He died Sept. 16, 1916.

Brush (old Fr. *broce*, brush-wood, mod. Fr. *brosse*). Instrument for sweeping up dirt or for applying paint or used for toilet purposes. The most ancient type consisted of a bunch of twigs; the most modern is a plastic-back hair brush the bristles of which can be taken out to be washed and can be replaced with a refill. Brushes are made of various materials. There are three main methods of brush-making: machine filling; hand drawing; pan setting. Materials used include natural fibres, *e.g.* Mexican (aloe), palm, and fibre mixtures; or processed fibres. Other materials used are horsehair, hogsbristle, nylon in various thicknesses, whalebone, goat, badger, and sable hair. Brushes of steel wire are used for cleaning metal, and of soft spun glass for working in acids. Brush stocks of various shapes and sizes are made from ebony, satinwood, common beech, birch, sycamore, etc. Plastics are used for toilet brushes, and ivory, tortoiseshell, and silver to cover wood stock. The small brushes

used by artists and known as pencils are usually made of sable, the dearest and best ichneumon and kolinsky. The long elastic hair of the badger is used for gilding and graining brushes, also for shaving brushes.

Simple brushes consist of a single tuft bound together with string or wire. An artist's pencil is a tuft delicately arranged to a point with the straight end tied and either inserted into a quill which, expanded in hot water and contracted on drying, holds the hair firmly, or fixed into a metal holder fastened into a wooden handle. A painter's sash brush, round, is arranged similarly, the ends being dipped into a patent cement and fixed into a two-pronged wooden handle by twine coated with glue. The modern painter uses a flat brush with the bristles fixed in a metal ferrule. Wire or a metal ring fastens large simple brushes.

Types of brushes are divided into set, drawn, and machine-filled. A set tuft is cut at the end, and a drawn tuft folded so that both ends of the bristles are used. An ordinary household brush is an example of the former and a hair brush of the latter.

The stock of the household brush is drilled with holes and small bundles of bristles are prepared by the ends being dipped into melted brush-maker's pitch, bound with string, and dipped again. The tuft is then pushed into one of the holes and the pitch on drying fastens it securely. Repetition of the process fills the stock with bristles. For drawn brushes, such as those used for the hair, the stock is thin and perforated with holes, the tufts being doubled and drawn into place by looping with thin brass wire at the back, the wire being continuous for the whole brush.

Machinery is used on an increasing scale for the manufacture of all kinds of household, toilet, and tooth brushes. A bundle of material is vertically placed in a container and a small quantity is picked by an arm semi-rotating with a cam. The knot of material is pushed through the filling nozzle where a piece of iron wire or nickel silver wire is cut off and looped round the knot and then directed through the nozzle channel by a plunger, which drives it into a board drilled with holes. This process is repeated throughout the brush.

Brush. Term used in electrical engineering. It is a device fitted to magnetos and similar electrical machines for collecting the current

from the rotating armature or commutator of the machine and delivering it to the stationary wires which lead it to where it is required. The brush is usually of carbon of a special quality.

Brush, CHARLES FRANCIS (1849-1929). American inventor. Born at Euclid, Ohio, March 17, 1849, he took a degree in engineering at Michigan university. In 1870 he entered business in Cleveland as a chemical expert, but he had already turned his attention to the problems of electric lighting, and about 1878 he invented the Brush electric arc lamp, and then the storage battery for electricity. He founded at Cleveland the Brush Electric Co. and the Linde Air Products Co. He died June 15, 1929.

Brush Turkey (*Cathartus lathami*). Large bird of the mound-builder group, found in Australia and the East Indies. The bird resembles a smallish turkey, and deposits its eggs in mounds of decaying vegetable matter.

Brusilov, ALEXEI ALEXEIEVICH (1853-1926). Russian commander in the First Great War. Born Aug. 19, 1853, of a noble family, he saw service in the Russo-Turkish War of 1877-78,

and in 1906 was appointed to the command of the 2nd Cavalry division of the Guard. Later he was military assistant to General Skalon, governor-general of Warsaw. When the First Great War began he was C.-in-C. of the Russian 8th army.



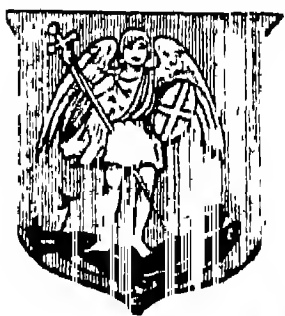
Alexei Brusilov,
Russian soldier

Brusilov played a distinguished part in the conquest of Galicia under General Ivanov in 1914. He followed Ivanov in 1916 as commander-in-chief of the Russian armies between the Pripiet and the Prut, and during the summer conquered a considerable area in E. Galicia and the whole of the Bukovina. In June, 1917, he replaced General Alexeiev as commander-in-chief of the Russian army, but within three months was superseded by Kornilov. He accepted the Bolshevik regime after the "October revolution" of 1918, but saw no active service under it. He retired in 1924 and died in Moscow, March 17, 1926.

BRUSSELS: THE CITY AND ITS BUILDINGS

This article describes the history and architectural landmarks of the Belgian capital, with a note on its occupation by the Germans in the First and Second Great Wars. See also Belgium; and the articles on Antwerp, Bruges, and other Belgian cities

Brussels (Flem. Brussel; French Bruxelles) is the old capital of Brabant and of the duchy of Burgundy, and since 1831 of the modern kingdom of Belgium. Situated on the river Senne, a tributary of the Scheldt, its name is derived from the word broek-



Brussels city arms

sele—a dwelling on the brook. The first dwelling was the 7th century monastery of S. Géry, erected on an islet in the stream at a point where there was a ford. Hereabouts in 980 the duke of Lower Lorraine built a castle which became the nucleus of the modern city.

Shortly afterwards Count Lambert of Louvain built the first wall, with a circumference of $2\frac{1}{2}$ m., a proof that the population was already considerable. It was not until 1235 that the city received its first charter of enfranchisement—releasing it from the feudal law. By this charter the citizens were

authorised to appoint seven sheriffs and thirteen jurors among themselves. The number seven played a significant part in the early life of the city. It had seven gates, seven aristocratic families (the lignages), seven sheriffs, etc. The modern capital comprises the city and 18 suburbs, each possessing its own corporation. The population was 965,000 in 1950—50,000 more than in 1939; in 1952 it was 968,139.

If Bruges and Ghent were earlier than Brussels in obtaining civic liberty, neither acquired a constitution in so large a sense as did Brussels in its second charter of 1312. Distinguished from all others by the name of Cortenberg, this has been deservedly called "the foundation of all Belgian liberties." The result was the attraction of more settlers into the city, and in the middle of the 14th century a new wall of a wider extent had to be constructed. The present Porte de Hal on the boulevards is part of this wall, which existed, more or less intact, until after Waterloo. The population

of Brussels was estimated in 1380 to be about 50,000, divided into 52 crafts or *métiers*, the principal being the armourers, brewers, and weavers, from which were formed the Nine Nations.

Brussels was the favourite city of the emperor Charles V, who greatly embellished it. He converted the old residence of the dukes of Brabant and Burgundy into a magnificent palace. A Gothic chapel, built under his personal supervision, was the object of general admiration. The tapestries were the finest ever produced from the looms of Bruges and Brussels. In the audience hall of this building Charles's abdication was staged; here also Margaret of Parma received the famous petition of the nobles. In the following century Albert and Isabella added to the priceless contents of the palace a splendid collection of Rubens masterpieces. The whole of this historic palace was destroyed by fire in 1731.

In the middle of the 17th century Brussels was a favourite place of residence with high-placed exiles. The great Condé, the English Charles II, and his brother James took shelter there. A French visitor of that day has left a pretty word-picture on record concluding with the observation that "if he had only found an apple tree in the park he would have felt sure that he was in the Garden of Eden." The park referred to was that part of the famous forest of Soignes which came to be known as the Bois de la Cambre, or simply the Bois.

19th Century Improvements

Great changes were made in the 19th century. When the old wall was demolished the Quartier Léopold—the aristocratic quarter—was formed; a little later the Senne was bricked over and the boulevards of the lower town were laid out under the direction of Burgomasters Anspach and De Brouckère; the modern avenues of Louise and Tervueren were due to Leopold II. But the old tree-bordered boulevard of the upper town remains virtually unchanged since it was laid out by Charles of Lorraine in the 18th century. The residential part of the city stands on what was known as S. Michael's Mount, about 300 ft. above the business centre of the city, but the old narrow and tortuous streets giving communication between them have gradually disappeared.

Brussels possesses but few memorials of its early days. The principal of these is the collegiate



Brussels. Map of the central part of the capital of Belgium, showing the main boulevards and principal buildings

church—not cathedral, although often so called—of S. Gudule, which is one of the most imposing buildings in Europe. Of the original church of the 11th century nothing remains, and the oldest parts are attributed to the 13th century. The bulk of the building, which is a specimen of pure Gothic, dates from the 15th century, and the massive towers and Gothic chapel of the sacrament were added early in the 16th century. A feature of the church is its magnificent old glass windows, some dating from the 15th century. It also contains a fine baroque pulpit by Verbruggen, representing the Fall.

Of still greater interest is the Town Hall on the famous Grand Place. This building is almost entirely of the 15th century, having been completed in the reign of Philip the Good, and it has come down well-nigh intact, despite the injury done in its vicinity by Gen. Villeroi's bombardment in 1695. The most unusual feature is the lofty spire, 370 ft. above the pavement, slightly to one side of the building, and surmounted by a gilded figure of S. Michael, the original patron saint of Brussels. The town hall contains fine tapestries, an interesting collection of archives, and some good modern pictures.

The Grand Place itself has many historical associations. It has witnessed battles and tournaments, popular festivities like the Ommeganc, and tragedies such as the execution of Egmont and Horn.

Other old buildings are the church of the Sablon—strictly Notre Dame des Victoires—and the Palais d'Arenberg, which contains part of Egmont's home.

The grand Law Courts was the architectural masterpiece of the 19th century in Belgium, and ensured the fame of its architect, Poelaert. The picture gallery, the enlarged royal palace, the exchange, the museum of the Cinquantenaire, and the Congo Museum at Tervueren are among the chief modern constructions.

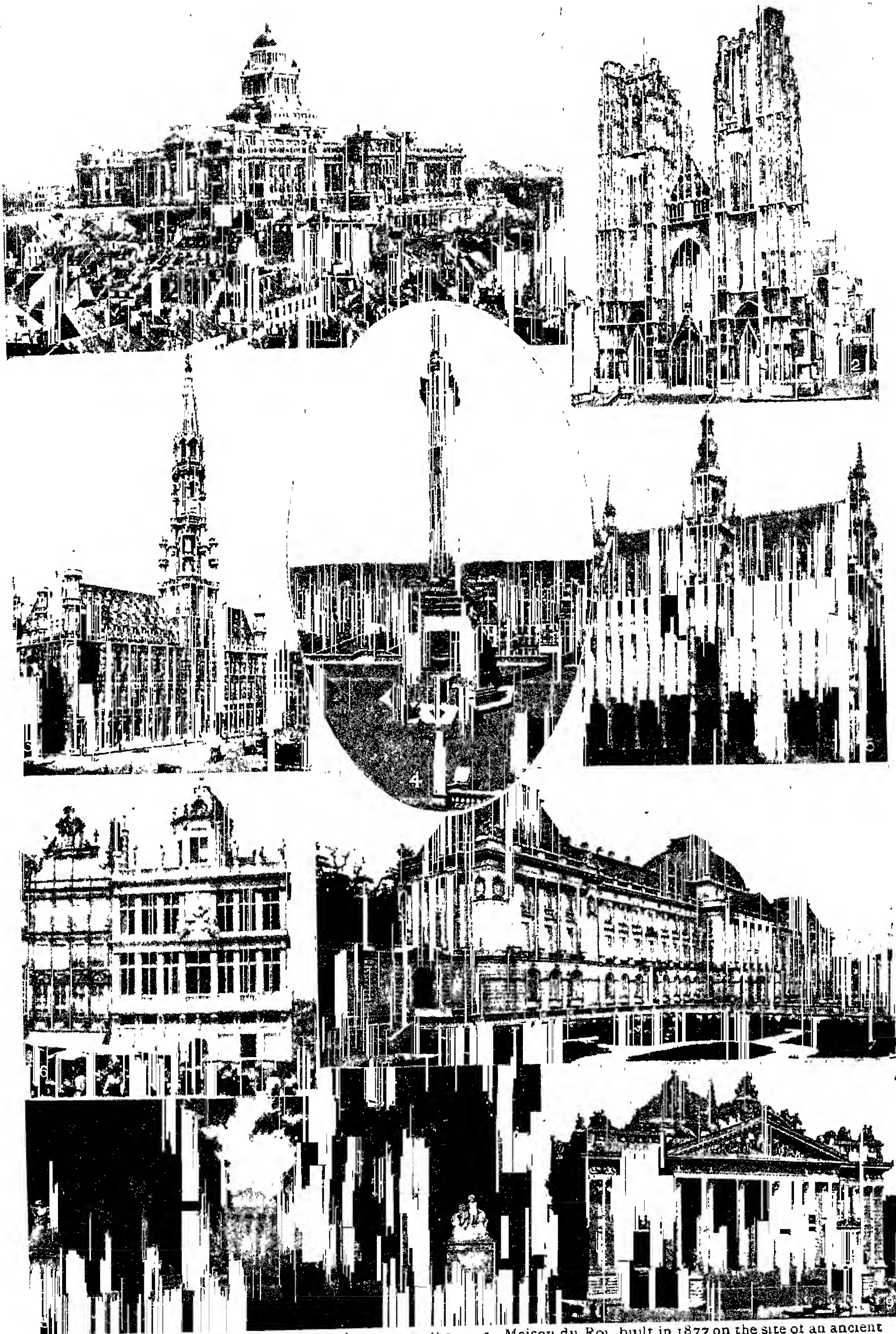
Brussels, as a centre of art, is little inferior to Antwerp. The collection of Flemish masters in the new gallery is rich and varied. There are fine examples of Van Eyck, Memling, and Quentin Matsys, as well as of Rubens, Jordaens, and Van Dyck. The churches, however, are less richly endowed with pictures than are those of Antwerp. Among the numerous theatres must be named the Monnaie, which, besides being one of the leading opera houses in Europe, is associated in the Belgian mind with the opening scenes of their

Revolution in 1830. So also is the park—with the House of Parliament at one end and the royal palace at the other—for here was fought the four days' battle in Sept., 1830, which led to the withdrawal of the Dutch garrison.

Brussels has many industries which give it a prominent position in the industrial world. It is famous everywhere for its lace manufactures; carpets, curtains, tapestry, and furniture employ a large section of the population. Glove-making is carried on on a large scale, and as the seat of government, as well as the favourite place of residence among wealthy Belgians, it flourishes on the luxury of the times. Ships of considerable tonnage are enabled to reach it by the deepened canal from Vilvorde and Antwerp, and it has been equipped on the scale of a seaport.

In the First Great War the Germans entered Brussels on Aug. 20, 1914, and remained until Nov., 1918, when King Albert made his formal re-entry. The city suffered privations and was fined £8,000,000, the burgomaster, Adolphe Max, being imprisoned by the Germans because the money was not forthcoming.

On May 17, 1940, the city was again taken by the Germans, and subjected to a fine of 5,000,000 francs and the imprisonment of the burgomaster, van de Meulebroeck, next year. The trial to which it was subjected during the 4½ years of occupation, i.e. until its final liberation by British Guards, Sept. 3, 1944, was far more severe than the one it had undergone during the earlier war. This time it was found impossible to send food relief through the blockade, and from 1941 the people of Brussels, even more than those of other big towns, were reduced to a state verging on starvation. The situation was relieved only by the use of the black market, which soon became an abuse after the liberation. To physical want and widespread diseases must be added the moral anxieties caused by ruthless oppression, involving wholesale deportations and a number of executions, which increased as the resistance movement developed during the last years of the war. Except for the burning of part of the Palace of Justice, the Germans did not damage the town during their retreat, but they left a train of misery from which Brussels only began to recover after the final liberation of Belgian territory in Jan., 1945.



1. The Palais de Justice (Law Courts), dominating the entire city. 2. Church of S. Gudule. 3. Hôtel de Ville (Town Hall). 4. Column commemorating the congress of 1831 which constituted Belgium a kingdom.

5. Maison du Roi, built in 1877 on the site of an ancient court house. 6. Maison des Boulangers (Hall of the Bakers' Guild). 7. Royal Palace. 8. View in the Park. 9. Stock Exchange, built at a cost of £400,000

BRUSSELS: SOME MAGNIFICENT PUBLIC BUILDINGS IN BELGIUM'S HISTORIC CAPITAL

Brussels. A British steamer. Owned by the Great Eastern Railway Company, she used to ply between Harwich and the Hook of Holland. Whilst under command of Captain Charles Fryatt (*q.v.*), on June 23, 1916, the Brussels was captured, about 50 m. from the Dutch coast, her crew being made prisoner. The steamer was later sunk in Zeebrugge harbour by the Germans, salvaged in 1919, and handed back to the U.K. in 1920.

Brussels, TREATY OF. For this pact of 1948 see Western Union.

Brussels Conferences. Assemblies at Brussels of representatives of various Powers to discuss international affairs. The most important of these was that of July 27, 1874. It was called at the suggestion of the tsar of Russia, and attended by representatives of all the chief countries of Europe, its object being to settle improved conditions for modern warfare. Common agreement was reached on the definitions of combatants, non-combatants, and spies, on the treatment of prisoners, of the sick and wounded, etc.

The following conferences have also been held: in 1876 to discuss the exploitation of Central Africa; in 1899-1900 to discuss the African slave trade; in 1937, under the Nine-Power Treaty of 1922, to deal with the Japanese invasion of China. Japan refused to attend the last in spite of her treaty obligations; and Italy opposed intervention in the China-Japan conflict. See International Law.

Brussels Sprouts. Vegetable of the large family Cruciferae, and the genus *Brassica*. It differs



Brussels sprouts

from other species of the genus in producing the small, well-known heads up the stem of the plants, for a season ranging from Oct. until March. Even after the sprouts have been cut, the tops serve as an edible vegetable. The connexion of this vegetable with Belgium is remote, as the best authorities agree that it is a native of Britain. Seed should be sown in March, and, to obtain the best results, pricked out into boxes when about 3 ins. high, before being planted out in June.

Rich loam, well manured, is the best ground in which to plant

brussels sprouts, and if well fed in this manner the plants will be from 2 ft. to 3 ft. high in the autumn, and may be cut from Oct. onwards. While the sprouts are still maturing, the cabbage shoots should be broken down, but, when the sprouts have passed their best, the plants may be left to develop the succulent, though much neglected, brussels tops. Brussels sprouts gain little from artificial manures and fertilisers.

Brut or **BRUTUS.** Great-grandson of Aeneas. According to a British legend, Brut was banished from Italy and found his way to Britain, where he built New Troy or London, and gave his name to the island. See Aeneas.

Bruton. Town of Somerset, England. It is 11 m. S.S.W. of Frome, with which it is connected



Bruton. Fine 15th cent. church in this Somersetshire town

by rly. It has a Perp. church, a pack-horse bridge, and almshouses dating from 1638. It was the birthplace of Sir William Berkeley, governor of Virginia. The record rainfall in 24 hours in Great Britain, 9.56 in., was measured at Bruton, June 28-29, 1917. Pop. (1951) 1,614.

Bruttii. Latin name (incorrectly Bruttium) of the S.W. promontory of Italy, corresponding to Calabria (*q.v.*). Its inhabitants, also called Bruttii, were subdued by Rome in the 3rd century B.C.

Brutus, DECIMUS JUNIUS (84-43 B.C.). One of Caesar's murderers. During the Civil War he fought on the side of Caesar, but afterwards joined the conspiracy against him. After Caesar's death he quarrelled with Mark Antony, and while attempting to join Marcus Brutus in Macedonia, he was betrayed by a friend and put to death by Antony's followers.

Brutus, LUCIUS JUNIUS. First consul of ancient Rome. A nephew of the tyrant Tarquinius Superbus, he escaped death at his uncle's hands by feigning madness; hence his surname Brutus (dullard). Indignant at the shameful treatment of Lucretia (*q.v.*),

wife of Collatinus, Brutus put himself at the head of a movement to expel the Tarquin family. The movement succeeded and Brutus and Collatinus became the first consuls of

Rome in 509 B.C. When his two sons were detected in conspiracy to restore the Tarquins, Brutus had them put to death in his presence. During an attempt of the Tarquins to regain possession of Rome with the aid of the Etruscans, Brutus and Aruns Tarquinius slew each other in single combat.

Brutus, MARCUS JUNIUS (85-42 B.C.). Roman soldier and politician, one of the murderers of Julius Caesar. Trained by his uncle the younger Cato according to aristocratic principles, he joined Pompey in the Civil War, although Pompey had killed his father. After the battle of Pharsalus, 48, Brutus was pardoned by Caesar, who made him governor of Cisalpine Gaul, with promise of further preferment. In spite of these marks of favour, Brutus, still a republican at heart, was easily persuaded by Cassius to join the conspiracy against Caesar. It is said that when Brutus stabbed him, the dying Caesar turned to him with the words *Et tu, Brute* (you too, Brutus). Brutus and Cassius led the army which opposed Antony and Octavian at Philippi in 42, and on the defeat of his troops Brutus committed suicide. For Shakespeare's treatment of the character of Brutus see under Julius Caesar.

Brüx. German name of Most (*q.v.*), a town of Czecho-Slovakia. It lies in the Sudetenland, the German-speaking part of the country seized by Germany in 1938.

Bryan, WILLIAM JENNINGS (1860-1925). An American politician and lawyer, remembered as prosecutor in the "Monkey Trial." Born at Salem, Illinois, March 19, 1860, he graduated



William J. Bryan, American politician



Lucius Junius Brutus, Roman consul
From a bust

at Illinois College and became a barrister in 1883. For a few years he practised at Jacksonville, and Lincoln, Neb. In 1891 he was returned to the House

of Representatives as a Democrat, having made a reputation by his speeches in the campaign of 1888. During the next four years he ardently supported the cause of bimetallism. In 1896 his party selected him as candidate for the presidency; the convention at Chicago was addressed by Bryan in the memorable oration which contained the phrase about crucifying mankind upon a cross of gold. He was, however, beaten by McKinley, as he was also in 1900. He denounced the acquisition of the Philippine Islands and again stood for the free coinage of silver. In 1900, too, he founded and edited a weekly paper, *The Commoner*.

Bryan was again an unsuccessful candidate in 1908, his opponent being W. H. Taft. Yet his powers as an orator kept him as leader of the party, in spite of the opposition of the Democrats of the East, who supported the gold standard. In the convention of 1912 he was largely responsible for the nomination of Woodrow Wilson, under whom, after the election, Bryan took office as secretary of state. He resigned 1915, disagreeing with Wilson's firm attitude towards Germany after the sinking of the *Lusitania*. He was a foremost advocate of international arbitration, and during his term of office he negotiated thirty arbitration treaties.

A convinced fundamentalist, Bryan was prosecuting attorney in the notorious "Monkey Trial" (*q.v.*) at Dayton, Tennessee, in July, 1925, where he made impassioned orations in support of the Bible's literal truth. He won the case, but survived the verdict only five days, dying July 26.

Bryan's numerous published works include *The First Battle*, 1896; *The Commoner Condensed*, 1902; *The Old World and its Ways*, 1907; *Heart to Heart Appeals*, 1917.

Bryansk. See Briansk.

Bryanston Square. London square, in Marylebone, W. Begun c. 1810, it was named after Lord Portman's seat near Blandford, Dorset, now a public school. Among its residents have been Sir R. Strachan, Henry Colburn the publisher, Joseph Hume the historian, Sir John Millais, and W. W. Oules, R.A.

Bryant, Sir Arthur Wynne Morgan (b. 1899). British historian. Born Feb. 18, 1899, educated at Harrow and Queen's College, Oxford, he was lecturer in history at Oxford 1925-36, and

educational adviser, Bonar Law College, Ashridge, 1929-39, of which institution he was a governor 1938-49. He was knighted in 1954. His vivid sense of the past and comprehensive manner of presenting characters and events gained him a large and appreciative public. He made his reputation with biographies of Charles II, 1931, and Pepys, 1933 (the latter continued 1933-38). Other historical studies include *Unfinished Victory*, and *English Saga*, 1940; *The Years of Endurance*, 1942; *Years of Victory*, 1944. *Makers of the Realm*, the first vol. of a large-scale history of England, appeared in 1953. Bryant succeeded G. K. Chesterton, 1936, as writer of "Our Note Book" in *Illustrated London News*.

Bryant, William Cullen (1794-1878). American poet and journalist. Born of New England stock,



William C. Bryant,
American poet

the son of a doctor, at Cummington, Massachusetts, Nov. 3, 1794, he was educated at William's College and called to the bar, 1815. In 1825 he went to New York, becoming assistant editor of *The Evening Post* in 1826 and editor in chief in 1828, a post which he held until his death, June 12, 1878.

His earliest work was *The Embargo*, a satire in the manner of Pope; it was published in 1808, and his mortuary poem, *Thanatopsis*, in *The North American Review*, in 1817. Of his other poems, *Lines to a Waterfowl*, a finished study in the manner of Wordsworth, *The Death of the Flowers*, and *The Battlefield*, which contains the famous "Truth crushed to earth shall rise again," all retain a certain popularity. Consult *Life*, John Bigelow, 1890.

Bryce, James Bryce, Viscount (1838-1922). British statesman and historian. Born at Belfast, May 10, 1838, he was educated at Glasgow and Trinity College, Oxford, and became fellow of Oriel. After spending some time at Heidelberg, he was called to the bar in 1867,



Bryce

and was regius professor of civil law at Oxford, 1870-93.

In 1880 Bryce entered Parliament as Liberal M.P. for the Tower Hamlets, and from 1885 to 1907 was M.P. for S. Aberdeen. He was made under-secretary for foreign affairs in 1886, and in 1892 entered the cabinet as chancellor of the duchy of Lancaster. He was president of the Board of Trade 1894-95. When the Liberals returned to power in Dec., 1905, he took the position of Irish secretary, resigning in 1907 to become British ambassador at Washington, whence he retired in 1913.

Bryce was president of the British Academy and of the Alpine Club, and a member of The Hague Tribunal. In 1907 he received the Order of Merit and his viscounty was conferred in 1914. He was appointed chairman, Dec., 1914, of the committee which investigated the outrages by German troops in Belgium. He died on Jan. 22, 1922. His writings include three standard works: *The Holy Roman Empire*, 1864; *The American Commonwealth*, 1888; *Modern Democracies*, 1921. Consult *Life*, H. A. L. Fisher, 1927.

Bryher. One of the inhabited Scilly Islands, off Cornwall, England. Lying W. of Tresco, it is the most exposed to the Atlantic of the principal islands, and at Hell Bay and Shipman Head fine effects of wave and rock are seen.

Brynmawr. Urban dist. and market town of Brecknockshire, Wales. It stands on a small tributary of the river Usk, 8 m. W. by S. of Abergavenny by rly., with a line from Pontypool. Mining and steelworks in the neighbourhood give the chief employment, and gowns, footwear, and electrical equipment are made. Market day, Sat. Pop. (1951) 6,521.

Bryony. Common name of two unrelated perennial climbing herbs distinguished as white bryony and black bryony. White bryony (*Bryonia dioica*), a native of Europe, N. Africa, and W. Asia, is a representative of the family Cucurbitaceae, which includes the cucumber and vegetable marrow. Like these plants, it climbs by means of tendrils. Its leaves are lobed, much like those of the grapevine, and the flowers are greenish-white, the male and female flowers being distinct. The fruit is a spherical berry about $\frac{1}{4}$ in. in



Bryony. Black
Bryony, *Tamus
communis*

diameter, at first green, but red when ripe. The rootstock is fleshy, tuberous, white, and of large size, and has purgative properties.

Black bryony (*Tamus communis*), sometimes called Our Lady's seal, a native of Europe and the Mediterranean region, represents the family Dioscoreaceae, which includes the tropical yams. Its underground rootstock is egg-shaped, fleshy, and black. Its long stems climb by twining around shrubs. The leaves are large and heart-shaped; the greenish flowers are small and inconspicuous, the sexes separate. The berries are oblong, $\frac{1}{2}$ in. in diameter, first green, then orange, red when ripe. The name is derived from Gr. *bryein*, to teem, referring to its luxuriant growth.

Bryophyta (Gr. *bryon*, mossy seaweed; *phyton*, plant). Botanical group, including liverworts and



Bryophyta. Hypnum, or feather moss

mosses. It exhibits well-marked features which distinguish it from the algae and fungi. In most Bryophyta the plant-body shows in the

of its tissues a greater division of physiological labour, though several algae in this respect are as far advanced as many members of the Bryophyta.

In most algae and fungi the production of sexual or asexual reproductive cells depends upon external conditions, whereas in the Bryophyta the life-history consists of two regularly alternating phases. A moss-plant, for example, bears male and female organs among its leaves, and the fertilised ovum, instead of developing into a new moss-plant, produces a very different structure known as the sporogonium, usually consisting of a slender stalk bearing a terminal capsule containing spores. The sporogonium is not an independent organism, but draws its nourishment from the green moss-plant. A moss spore on germination gives rise to a new moss-plant, completing the cycle. There is a regular alternation of generations, the sexual (moss-plant) followed by the asexual (sporogonium). See Liverworts; Mosses.

Brythons. Later branch of the Celtic-speaking peoples, who carried to Britain the Brythonic or P-Celtic speech. This developed into the Welsh, the Breton, and the recently extinct Cornish dialects.

This Welsh word, introduced by Rhys in 1882, displaces the earlier Cymric, which is liable to confusion with the Cimbri of N.W. Europe and the Cimmerians of E. Europe. The Brythons brought the Iron-age culture into Britain about 400 B.C., and were of mixed Alpine and Nordic stock, tall, heavily built, many of them red-haired.

Bryum. Genus of mosses belonging to the family Bryaceae and the division Acrocarpi. Their spores



Bryum. Genus of mosses bearing spore cases at the end of a shoot

are borne at the summit of a shoot, and they are sometimes called thread mosses. The leaves are of simple structure and have an elementary midrib. The shape of the sporogonium is more or less oval, at first covered by a thin cap, easily detached by the wind, beneath which is the operculum or lid, detached when the fine, dust-like spores are ripe, revealing the peristome. This consists of a series of teeth, which are hygroscopic and close down or spread out according to the moisture in the air—for the protection or release of the spores.

Brzesc-nad-Bugiem. Polish name of the White Russian town Brest (*q.v.*), formerly called Brest-Litovsk.

Brzezany. Town of the Ukraine S.S.R. Situated on the Zlota Lipa river, it lies 50 m. S.E. of Lvov, with which and with Tarnopol it is connected by rly. It is the centre of an agricultural district and manufactures leather. It has an old castle. An important strategic centre, it and the hilly and forested district round it were the scene during the First Great War of heavy fighting, especially in Sept., 1916, and July, 1917. At that time in Austria-Hungary, Brzezany passed to the newly created Poland after the First Great War until 1939, when the area in which it is was occupied by Russia and incorporated in the Ukraine (*q.v.*). It was in German hands 1941-44.

Buaze-Fibre Plant (*Securidaca pallida*). Trailing shrub of the family Polygalaceae. A native of Africa, it has smooth, pale-green,

oblong leaves, and flowers of dingy purple, resembling those of the common milkwort of Europe. The long twigs yield valuable fibres, like those of flax, from which cords and fishing nets are made.

Bubastis. Ancient city near Zagazig, Lower Egypt, the Pibseth of Ezek. 30. Occupied in the Pyramid age, it became a royal residence under Shishak I, whence the XXII dynasty is called Bubastite. The temple, extended by Osorkon II, was uncovered by Naville in a mound called Tell Basta, 1887-89. It was sacred to the cat-headed goddess Bast, and its cat cemetery covered many acres. See Egypt: History.

Bubo (Gr. *bubon*, groin). Swelling of a gland in the inguinal region or groin. The term is now virtually limited to swellings in this region caused by venereal disease or plague. See Plague.

Bubonic Plague. Acute infectious disease caused by the *bacillus pestis*. The epidemic in the 14th century known as the Black Death was bubonic plague. The name is derived from the fact that in one form of the disease the lymphatic glands become enlarged and inflamed, sometimes forming buboes. See Black Death.

Bucaramanga. Town of Colombia, capital of the dept. of Santander. It stands on the Lebrija river, 3,248 ft. above the sea, on the main road from Bogotá to Maracaibo, and is connected by rly. with Puerto Santos. Well built, with wide streets and fine public buildings, it is a great coffee mart and the centre of a district rich in gold, silver, copper, and iron. Pop. (1951) 112,252.

Buccaneers. Name applied chiefly to the maritime adventurers, British and French, who established themselves in the West Indies and waged war upon Spain and Spanish commerce throughout the 17th century. It is applied also to their predecessors in the 16th century and sometimes to the pirates of the early part of the 18th century. The name is taken from the Caribbean *boucaoni*, adopted in French as *boucan*, a place or frame for smoke-drying flesh, in which the buccaneers carried on a large trade. Even when Spain was nominally at peace with other European powers, it was common doctrine that there was "no peace beyond the line"—not the equator, but the line drawn from N. to S. by Pope Alexander VI in 1492, when he allotted all geographical discoveries on the W. of it to Spain and on the E. of it to Portugal.

French, English, and Dutch refused to recognize the jurisdiction of the Spaniards and claimed the right of reprisal for all attempts to curtail their liberty. The home governments declined to restrain them, and for all practical purposes a perpetual state of war was carried on by the adventurers, who formed associations and acted in concert, trading at the sword's point, but seeking plunder much more than trade. In 1630 the Buccaneers seized and fortified the island of Tortuga, which they made their headquarters. Periodically the Spaniards succeeded in expelling them, only to be driven out again themselves; but after the official conquest and occupation of Jamaica by Cromwell in 1655, that island provided them with a more secure base for their operations.

Of the British captains the most famous was Sir Henry Morgan, a Welshman, who in 1666 succeeded the Englishman, Edward Mansfield, as admiral of the Buccaneers. While their operations were exclusively directed against the Spaniards it is possible to defend them, but by the end of the 17th century they had degenerated into mere pirates. The wars between William

III and Louis XIV broke up what had hitherto been an organized association of French and English, and after 1701 the name buccaneer became merely a synonym for pirate.

Buccina OR BUCINA. Musical instrument of the Romans. Used by sailors in its earliest forms, it was derived from

Buccina. Examples of the Roman musical instrument

a shell, but the buccina of the Roman army was of brass, and either C-shaped or straight.

Buccinator (Lat., trumpeter). Name of the muscle attached to the upper and lower jaws and the angle of the lips. It takes part in closing the mouth, keeps food from collecting between the teeth and the cheeks in the act of chewing, and is employed when a person whistles or blows a wind instrument—hence its name.

Buccleuch, DUKE OF. Scottish title borne by the family of Scott since 1663. The present holder re-

presents three dukedoms, Buccleuch, Queensberry, and Montagu, as is shown by the family surname of Montagu-Douglas-Scott. A powerful border family, the Scotts received extensive lands from James II of Scotland in the 15th century, and one of them figures in *The Lay of the Last Minstrel*.

Walter Scott was created an earl in 1619, and after his death his granddaughter Anne, failing male heirs, became countess of Buccleuch. In 1663 she married the duke of Monmouth, who was then made duke of Buccleuch. After Monmouth's death the duchess retained her titles, which passed on her own death to her grandson, Francis, the 2nd duke. He was restored to the honours his grandfather had forfeited, including the English title of earl of Doncaster. Henry, the 3rd duke (1746–1812), inherited in 1810 the title and estates of the duke of Queensberry, and his wife received from her father the property of the dukes of Montagu. The 6th duke (*v.i.*) was a Conservative politician. The 8th duke (b. 1894) succeeded his father in 1935. In addition to his dukedom his titles are one of marquess, four of earl, one of viscount, and four of baron. His sister, Lady Alice, married in 1935 the duke of Gloucester, third son of George V.

The duke owns valuable estates in the S. of Scotland. His chief residences are Dalkeith Palace, near Edinburgh, and Drumlanrig Castle, the old seat of the dukes of Queensberry, in Dumfriesshire. The duke's eldest son bears the courtesy title of earl of Dalkeith. Buccleuch itself is in Selkirkshire. *Pron.* Buc-l'oo.

Buccleuch, WILLIAM HENRY WALTER MONTAGU-DOUGLAS-SCOTT, 6TH DUKE OF (1831–1914). British politician. Born Sept. 9, 1831, he was a son of the 5th duke, whom he succeeded in 1884. Educated at Eton and Christ Church, Oxford, he was, as earl of Dalkeith, Conservative M.P. for Midlothian 1853–68 and 1874–80, when he was defeated by Gladstone after the famous Midlothian campaign. He died at Montagu House, London, Nov. 5, 1914.

Bucentaur (Ital. *buzino d'oro*, ship of gold). Name of the galley in which the doges of Venice went out to perform the ceremony of wedding the sea. The ceremony, inaugurated to mark the conquest of Dalmatia, took place annually on Ascension Day from about 1000 to 1789. It consisted of a procession of boats, a religious

service, and the dropping by the doge of a consecrated ring into the Adriatic. There are some remains of the last Bucentaur (1729) in the arsenal at Venice.

Bucephalus (Greek *bous*, ox; *kephalē*, head). Alexander the Great's warhorse. It died 326 B.C., on the banks of the Hydaspes, the modern Jhelum, in the Punjab, where the king built the city of Bucephala in honour of his favourite. Tradition says that Alexander when a boy broke in the horse, a necessary preliminary, according to the oracle, to securing the throne of Macedon.

Bucer, MARTIN (1491–1551). A German Protestant. Born at Schlettstadt, Alsace, Nov. 11, 1491, he became a Dominican friar, but in 1521 obtained a papal dispensation allowing him to leave the order. He was already under the influence of Luther, and in 1522, though still a priest, married an ex-nun. Excommunicated by the bishop of Spire for preaching against Rome, he settled at Strasbourg in 1523, and during the next 18 years unsuccessfully endeavoured to reconcile the various doctrines of the Protestants. On the invitation of Cranmer, he went to England, was made regius professor of divinity at Cambridge, and assisted in the revision of the first Edwardian book of common prayer. He died Feb. 28, 1551, and was buried in Great S. Mary's Church, Cambridge, his body being exhumed and publicly burnt in 1557. *Consult* Martin Bucer and the English Reformation, C. Hopf, 1946.

Buch, WALTHER (b. 1883). German judge. Born at Bruchsal, Baden, Oct. 24, 1883, he was at one time a major in the army. He became chief party judge of the Nazi organization and created the *Uschla*, a committee for adjusting disputes which became a kind of secret court for disciplining party members. Buch must be ranked as one of the mainstays of the Nazi regime. He was a deputy of the puppet Reichstag and held a rank in the S.S. equivalent to that of general in the German army.

Buchan. District of N.E. Aberdeenshire, Scotland. It is situated between the Ythan and Deveron rivers and embraces the towns from Peterhead to Fraserburgh. The coastline, 40 m. long, is precipitous, and at the famous Bullers ("boilers") of Buchan, 6 m. S. of Peterhead, is a deep cavern amid rocks, where the sea rushes through an arch and "boils" during storms. A haunt of smugglers,

Buchan has been dealt with by Scott and Johnson, and by J. B. Pratt in his *History of Buchan*, 1858.

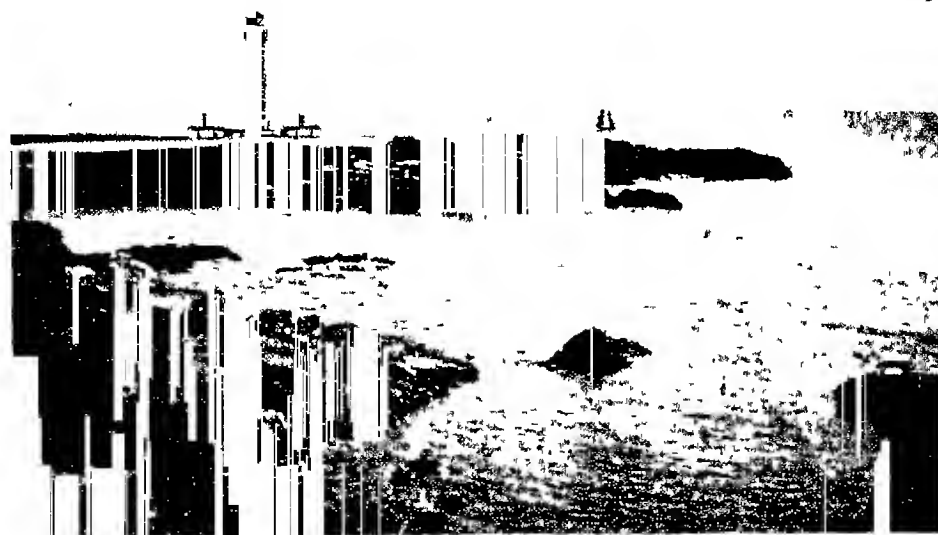
Buchan Ness, or Boddam Point, is the most easterly point of the Scottish mainland in N.E. Aberdeenshire. It is 3 m. S. of Peterhead, and has a lighthouse with a flashing light, visible for 18 m. *Pron. Buckan.*

Buchan, EARL OF. Scottish title held by the Comyns, the Stewarts, and, since 1617, by the Erskines. With Mar it formed one of the oldest of the Scottish earldoms, but the two were separated before 1300. At this time the Comyns held the earldom, but about 1380 King Robert II gave it to his son Alexander Stewart, called the Wolf of Badenoch. Alexander's nephew and successor, John Stewart, was killed at Verneuil while fighting for France against England (1424).

In 1469 another Stewart, Sir James, was made earl, and this creation exists today. The Stewarts held it until 1601, when on the death of the 5th earl it passed to his daughter Mary, wife of James Erskine, son of the earl of Mar. These were confirmed as earl and countess in 1617, and their descendants hold the title. The earl's eldest son is called Lord Cardross, a title dating from 1606 and inherited by the 9th earl of Buchan.

Buchan, CHARLES MURRAY (b. 1891). British footballer. Born at Plumstead, London, Buchan assisted the Arsenal football club while still a pupil at Woolwich Polytechnic secondary school. He joined the Arsenal from Sunderland 1925, and retired 1928, becoming a sports journalist. He played in four internationals and was one of the greatest inside forwards of football.

Buchan, ELSPETH (1738-91). Founder of the Scottish sect of Buchanites. Daughter of an innkeeper in Banffshire, Scotland, she moved to Glasgow and declared she was the woman clothed with the sun mentioned in Rev. 12. Expelled from Irvine, 1784, she with some 40 followers called Buchanites settled at New Cample, near Thornhill, where they lived a communal life, and awaited a speedy millennium. The sect did not long survive her death. *Consult The Buchanites*, J. Train, 1846.



Buchan Ness. The lighthouse on this, the most easterly, point of the Scottish mainland
Valentine

Buchan, JOHN (1875-1940). British author and administrator, who became famous as a novelist under this name before 1935, when he was created 1st Baron Tweedsmuir (*q.v.*).

Buchan, WILLIAM (1729-1805). Scottish physician. Born at Ancrum, in Roxburghshire, he became a general practitioner in Edinburgh, and later in London. He was the author of *Domestic Medicine, or The Family Doctor*, the first work of its kind published in Great Britain, first issued in 1769 and having extensive sales. He died in London, Feb. 28, 1805.

Buchanan, DUGALD (1716-68). Scottish Gaelic poet. From 1755 a schoolmaster and preacher in the Highlands, he died July 2, 1768. His *Spiritual Songs*, 1767, Gaelic poetry of sombre religious type, have been frequently translated into English. An obelisk at Kinloch Rannoch commemorates him.

Buchanan, GEORGE (1506-82). Scottish scholar and historian. Born at Killearn, Stirlingshire, the



George Buchanan, Scottish scholar
Painting by F. Pourbus

son of a small farmer, he began his studies in Paris at the age of 14. In 1522 he returned to Scotland, graduated at St. Andrews in 1525, and went again to Paris, but on becoming tutor to the son of the earl of Cassilis, accompanied his pupil back to Scotland in 1537. About this time, having incurred the enmity of Cardinal Beaton by his Latin satires on the friars, *Somnium* (Dream) and *Franciscanus*, he was imprisoned in the castle of St. Andrews, but escaped to France, 1539. He held professorships at Bordeaux and Paris, and later at Coimbra, where he fell under the displeasure of the Inquisition, and was for a time confined in a mon-

astery. After his release he visited England, but for about seven years, from 1553, was in France.

Returning to Scotland for the last time, Buchanan was made classical tutor to Queen Mary in 1562, and principal of St. Andrews in 1566. He now openly identified himself with Protestantism and, appointed moderator of the general assembly in 1567, was conspicuously hostile to Mary. In 1570 he was appointed tutor to the young king James VI, then four years old, and until 1578 also held the office of lord privy seal. He died at Edinburgh, Sept. 28, 1582.

In his declining years he wrote in Latin his most important works, *De Jure Regni Apud Scotos*, 1579, a treatise on the limitations of monarchical power; and *Rerum Scoticarum Historia*, 1582, a history of Scotland, which, though uncritical and partisan, is valuable as an authority for Buchanan's own period. As a scholar, Buchanan enjoyed a European reputation. He wrote in Latin with singular facility, while his native poetic feeling finds forceful expression in his Latin translations of the Psalms.

Buchanan, SIR GEORGE WILLIAM (1854-1924). British diplomatist. Born at Copenhagen, Nov. 25, 1854, he was educated at Wellington College, and entered the diplomatic service in 1875. After holding posts at Rome, Tokyo, Vienna, and Berne, he was chargé d'affaires at Darmstadt, 1893-1900, and in 1898 he was agent to the Venezuela arbitration tribunal. Having served at Rome, Berlin, Sofia, and The Hague, he was British ambassador to Russia from 1910 to 1918 and died Dec. 20, 1924.

Buchanan, JACK (b. 1891). British actor, manager, and producer. Born at Helensburgh, near Glasgow, April 2, 1891, and educated at Glasgow Academy, he first appeared on the professional stage at the Apollo Theatre, London, in *The Grass Widows*, 1912. He toured in *Tonight's the Night*, 1915-17. In 1922 he went into management on his own account with the musical comedy, *Battling Butler*. An engaging personality and clever dancing led him to become one of the most popular musical comedy actors in both London and New York. His performance as Lord Billing in a revival of *The Last of Mrs. Cheyney*, 1944, marked his first appearance in "legitimate" drama. He also starred in musical and comedy films.

Buchanan, JAMES (1791-1868). President of the U.S.A. Born near Mercersburg, in Pennsylvania



James Buchanan

on April 23, 1791, he was educated there and at Dickinson College. He served in the Pennsylvania legislature, 1815-16; he also rapidly achieved great success as a lawyer. He was a representative in congress 1820-31. President Jackson sent him as minister to Russia 1832-33; and in 1835 he entered the senate as a Democrat, serving there until he became President Polk's secretary of state in 1845. In that post he gained credit for the settlement of the Oregon dispute with Great Britain and had some share in the settlement of the Mexican War.

While U.S. minister in London, 1853-56, Buchanan, with the U.S. ministers to France and Spain, issued the "Ostend manifesto," following a meeting they held at Ostend, calling for the annexation by the U.S.A. of Cuba, a move Buchanan had already advocated when secretary of state, and which endeared him to the southern states. Elected president-to-be in Nov., 1856, he proved himself totally inadequate to deal with the critical years of his period of office when bitterness over slavery was mounting. Even after Lincoln's election in 1860 brought matters to a head, Buchanan still did nothing: the presidency, in fact, was probably at its lowest point during his term of office. After Lincoln's inauguration, March 4, 1861, Buchanan went into retirement. In 1866 he published his apologia, *Mr. Buchanan's Administration on the Eve of the Rebellion*. He died at Wheatland, Pennsylvania, June 1, 1868. His works appeared in 12 vols., 1908-11; he has a large monument in Washington.

Buchanan, ROBERT WILLIAMS (1841-1901). British poet, novelist, and playwright. Born at Caverswall, Staffordshire, Aug. 18, 1841, and educated at Glasgow university, he came to London with David Gray (*q.v.*) in 1860, and obtained employment on *The Athenaeum*. All the



Robert Buchanan

Year Round, and other periodicals. With his *London Poems*, 1866, his reputation was established as a writer of narrative poetry. Between 1866-76 he was engaged in a controversy with D. G. Rossetti and Swinburne, whom he attacked as leaders of The Fleshly School of Poetry. It resulted in a successful libel action against Swinburne, 1876, and an apology to Rossetti, 1882.

In 1876 he published his first novel, *The Shadow of the Sword*, and in the next 14 years some 20 works of fiction, including *God and the Man*, 1881. He also successfully dramatised several novels for the stage, including Fielding's *Tom Jones* and Joseph Andrews, renamed respectively *Sophia* and *Joseph's Sweetheart* (Vaudeville, 1886 and 1888). He died at Streatham from a paralytic stroke, June 10, 1901. *Consult* Life, Harriett Jay, 1903.

Buchan Spells. Periods of the calendar during which the mean temperature over several years is slightly lower or higher than that of days before and after. There are six cold periods, Feb. 7-10, April 11-14, May 9-14, June 29-July 4, Aug. 6-12, Nov. 6-12; and three warm periods, July 12-15, Aug. 12-15, Dec. 3-9. They are named after Alexander Buchan (1829-1907), secretary of the Scottish meteorological society. Much misconception of their meaning has arisen. Buchan's observations were concerned with a small area of Scotland, not meant to apply to the British Isles generally; nor did he suggest that a cold or warm spell might be expected on the dates given in any particular year, but that over a long time there would be an irregularity of a fraction of a degree compared with the seasonal normal. It happens that some periods are also known to tradition or confirmed by statistics in Europe. *Consult* Buchan's Days, E. L. Hawke, 1937.

Bucharest. Variant spelling of the name of the Rumanian capital, Bukarest (*q.v.*).

Buchenwald. Concentration camp established by the Nazis near Weimar, Thuringia. When, on April 12, 1945, the 6th armoured div. of the U.S. 3rd army overran it, it held some 21,000 prisoners, confined without any kind of trial, including German and other Jews, Germans, Poles, Czechs, Frenchmen, Hungarians, and Russians, all on the verge of death from starvation. An Allied report stated that 51,572 prisoners

had died or been done to death in Buchenwald, or been sent thence to extermination camps. Operations and scientific experiments were carried out on prisoners without anaesthetics and other barbarities were perpetrated.

Hermann Pfister, commandant of the camp, Ilse Koch, widow of a former commandant (executed as a war criminal), and 21 others were tried by a U.S. military court at Dachau in Aug., 1947, for the murder and ill-usage of Allied internees; Koch was condemned to life imprisonment (later reduced to four years); the others, condemned to death, were hanged. On her release in 1949 Koch was arrested by the Germans to be tried for maltreatment of German internees. The camp was continued in use by the Russians until 1950.

Bucher, LOTHAR (1817-92). German politician. Born at New Stettin, Oct. 25, 1817, the son of a schoolmaster, he attended the university of Berlin, and became a lawyer. In 1848 he was elected to the National Assembly in Berlin. At that time a democratic leader, he was sentenced to imprisonment for planning a collective refusal of taxpaying, but escaped to England, where he remained for ten years as a newspaper correspondent. In 1860 he returned to Germany, and in 1864, having broken with his former allies, entered the public service of Prussia. From 1866 he was secretary to Bismarck, whose confidence he enjoyed until his death, Oct. 12, 1892. Bucher wrote on economic subjects, and attacked the British policy of free trade.

Buchez, PHILIPPE JOSEPH BENJAMIN (1796-1865). French philosophical writer and politician. Born in the Ardennes, March 31, 1796, he qualified in Paris as a physician in 1825. At that time a member of various secret societies, he took part in conspiracies against the Bourbons, and, being arrested, narrowly escaped with his life. In 1848 he was president of the Constituent Assembly, when it was invaded by rioters, but subsequently took no active part in politics. He died Aug. 12, 1865.

He founded a neo-Catholic system of philosophy, the basis of which, as set forth in his paper *L'Européen*, was protective association as a means of the emancipation of the working classes. He held that man is intended, both morally and politically, for progress; moral progress consists in the exercise of Christian morality.

Buchis. Sacred bull of Hermonthis in ancient Egypt. The burial-place of these bulls was excavated at Armant (Hermonthis) 9 m. S. of Luxor, in 1931-32. Consult *The Bucheum*, R. Mond and O. H. Myers, 1934.

Buchman, FRANK NATHAN DANIEL (b. 1878). American evangelist and author. Buchman was born at Pennsburg, Pa., June 4, 1878, and was educated for the ministry in his own country and at Westminster College, Cambridge. In 1902 he became minister of a Lutheran church at Overbrook, Pa., and was in charge of Christian work at the state college, 1909-15. Later Buchman was associated with the Y.M.C.A. and travelled widely on lecture tours. After he visited Oxford in 1921 as the founder of a body which took the name of the Oxford Group, his evangelistic activities spread to many countries. In 1938 he inaugurated in London his Moral Rearmament campaign for a world-wide spiritual revival to prevent war.

Büchner, EDUARD (1860-1917). German chemist. He was born in Munich, May 20, 1860, and was educated at Munich and Erlangen universities. He was appointed professor of chemistry at Kiel, Tübingen, and Berlin successively, and was awarded the Nobel prize for chemistry in 1907. Büchner devoted himself to researches in connexion with fermentation and enzyme action. He died Aug. 24, 1917, of wounds received while serving in the German army.

Büchner, LUDWIG (1824-99). German philosopher. Born at Darmstadt, March 29, 1824, he qualified as a physician and became a lecturer at Tübingen. A materialist, he regarded natural philosophy as the foundation of all philosophy. Only one thing exists, which is at the same time force and matter: neither force nor matter has a separate existence. God is nature herself, and man a product of nature. Life and thought are only special forms of the general movement of nature. The human soul is merely the brain itself, therefore perishable. His chief work, *Force and Matter*, 1855, aroused such feeling that he was obliged to resign his lectureship. He died May 2, 1899.

Buchon, JEAN ALEXANDRE (1791-1849). French historian. Born at Meneton-Salon, May 21, 1791, he took some part in politics, but spent much of his early manhood in travel and study. His

fame rests upon the various collections of historical documents which he made, the most copious being his *Collection of the national chronicles of France of the 13th and 14th centuries*, published in 47 vols., 1824-29. He died Aug. 29, 1849.

Buchu (*Barosma*). Genus of heath-like evergreen shrubs, of the family Rutaceae. Natives of S. Africa, they have flat, leathery, opposite or alternate leaves, more or less dotted with glands from which a rue-like odour is given off. The pretty white, red, or purplish flowers arise singly from the axils of the leaves. Several species—*B. betulina*, *B. crenulata*, and *B. serratifolia*—are used as a stimulant and tonic in chronic disease of the bladder and in dyspepsia, the dried leaves being used to prepare an infusion or a tincture.

Buck. Word derived from the Anglo-Saxon and meaning the male of the deer. It is used also for the male of certain other animals, e.g. rabbits and hares. The usual feminine is doe. The word is used by analogy for a young man of fashion. See *Deer*.

Buck, PEARL SYDENSTRICKER (b. 1892). American novelist. She was born at Hillsboro, W. Virginia, June 26, 1892, and educated at Randolph-Macon college and Cornell university. As the daughter of missionaries in China, she spent most of her childhood in that



Pearl Buck,
American novelist

country, speaking Chinese before she had mastered English. She taught at Nanking university from 1921 to 1931. Her novels of China are noted for their understanding and sympathetic treatment of the peasants; and in 1938 she was awarded the Nobel prize for literature. Her first published novel, *East Wind-West Wind*, 1929, was followed by *The Good Earth*, 1931, which provided the story of the

film of this name. Later works included *House of Earth*, 1935; *Portrait of a Marriage*, 1946. She published an autobiography, *My Several Worlds*, in 1955.

Buck, SIR PERCY CARTER (1871-1947). British musician. Born at West Ham, March 25, 1871, he went to Merchant Taylors' and the Royal College of Music. He was successively organist of Worcester College, Oxford, Wells Cathedral, Bristol Cathedral; and in 1901 was appointed director of music at Harrow school, where he remained until 1927 and contributed a great deal to English musical education. He was professor of music at Dublin university 1910-20, and at London university from 1925. Knighted in 1936, he died Oct. 3, 1947.

Bückeburg. Town of Germany, in North Rhine-Westphalia. It stands on the river Aue, and the Cologne-Berlin rly., 30 m. S.W. of Hanover. It has a palace, a castle, a 17th century and other churches, and a large park. It dates from the second half of the 14th century, and was at one time a fortified town. Pop. 5,632.

Buckeridge, JOHN (c. 1562-1631). English prelate. Born at Draycot Cerne, Wilts, he went to Merchant Taylors' and S. John's College, Oxford. At Oxford he was tutor to Laud, and to it he returned in 1605, when he was made president of S. John's College; meanwhile he was a rector of S. Giles, Cripplegate, and had won fame as a controversialist. In 1611 he became bishop of Rochester, and in 1628 bishop of Ely. The bishop, who belonged, like Laud, to the high church party, died May 23, 1631.

Bucket. Name for a vessel for holding or drawing water. The compartments on a water wheel are called buckets, and buckets are largely used also in dredging and excavating. Bucketing is also a term for rowing in an irregular fashion. See *Dredging*.

Bucket Shop. Term used for the office of a broker not a member of a stock exchange, and therefore not subject to its rules and penalties, who deals in stocks and shares of a speculative and often of a swindling nature. The expression is said to be derived from the lift, called a bucket, in which speculators were taken up to a small gambling exchange in Chicago. The Prevention of Fraud (Investments) Act of 1939, requiring all dealers in securities to be licensed, greatly reduced the activities of swindling bucket shops.

Buckfastleigh. Urban district of Devonshire, England. It is 7 m. N.W. of Totnes, on the rly. Blankets and serges are manufactured, and there are tanneries and decayed tin and copper mines. Pitchblende has been found on the Kingswood estate, formerly the property of Lord Macclesfield. The ruined Cistercian abbey was partly restored 1882-1937 by French Benedictines; worship was resumed 1922 and the church was consecrated 1932; near by is a Tudor mansion, The Grange, with fine tithe-barn. Pop. (1951) 2,592.

Buckhaven AND METHIL. Town and police burgh of Fife, Scotland, on the N. shore of the Firth of Forth, 7 m. N.E. of Kirkcaldy. Its former harbour and pier fell into disuse and were destroyed by gales. It had a brisk fishing industry for several hundred years. Coalmines near provide the chief occupation. Methil has docks for coal exporting. Pop. (1951) 20,152.

Buckhound. British breed of hound. Much used in the Middle Ages for buck hunting, it has become virtually extinct.

Buckie. Police burgh and fishing town of Banffshire, Scotland. It stands on Buckie burn, which divides it into Easter and Nether Buckie, 14 m. to the N. of Keith. It has the most commodious harbour on the S. of Moray Firth, and is the headquarters of fisheries between Banff and Findhorn, with the largest pop. of inshore fishermen in Scotland. Quays (about a mile) were built 1880-1932. Buckie has sail, rope, and net industries, sawmills, and a distillery. Pop. (1951) 7,703.

Buckingham. Borough and market town of Buckinghamshire, England. Situated on the Ouse, which encloses it on three sides, 61 m. to the N.W. of London, it is served by the railway. It manufactures flour, condensed milk, malt, carpets, paint, and varnish, and has

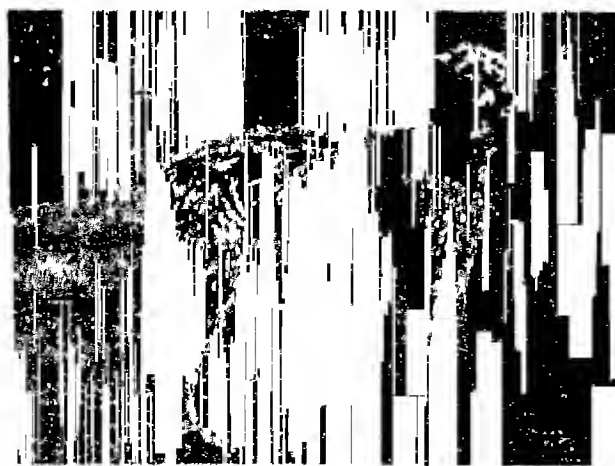


Buckingham
borough arms

several light engineering works. Its grammar school was founded in 1548 by Edward VI. Buckingham, fortified by Edward the Elder in 918, and once a prominent agricultural and wool trading centre, gives its name to a co. constituency. Near by is Stowe, opened as a public school in 1923. Market day, Tuesday. Pop. (1951) 3,942.

Buckingham, DUKE OF. English title borne by the families of Stafford, Villiers, Sheffield, and Grenville, with intervals, from 1444 to 1889. In medieval times there were earls of Buckingham, the first probably existing in the time of William II. In 1377 Thomas, duke of Gloucester, was made earl of Buckingham and the title descended to his grandson, Humphrey Stafford, created a duke in 1444. This title became extinct when Edward, the 3rd duke, was executed in 1521.

In 1617 the earldom was revived by James I for his friend George Villiers, who in 1623 became a duke. This title became extinct when the 2nd duke died in 1687. The dukedom was revived in favour of John Sheffield, marquess of Nor-



Buckhound, an almost extinct breed of hound once used for deer hunting

manby, and he and his son held the title of duke of Buckingham and Normanby from 1703-35, when it again became extinct. In 1784 George Grenville, Earl Temple, was made marquess of Buckingham, and in 1822 his son Richard, the 2nd marquess, who had married the only child of the last duke of Chandos, was created duke of Buckingham and Chandos.

Of the Grenville family there were three dukes. The third, Richard Grenville (1823-89), was a Conservative politician, being colonial secretary in 1866-68. He died without sons in 1889, when the dukedom and marquessate became extinct. The earldom of Temple passed to his nephew, William Stephen Gore-Langton, and his viscounty of Cobham to the 5th Lord Lytton as the eldest male descendant of Christian Grenville, a younger sister of Sir Richard Temple, created Viscount Cobham in 1718. The duke's daughter received only the Scottish barony of

Kinloss. This peer was duke of the town of Buckingham, whereas John Sheffield had been duke of the county. The duke's seat of Stowe, containing a valuable library, near Buckingham, came to the Grenvilles from Sir Richard Temple.

Buckingham, HUMPHREY STAFFORD, 1ST DUKE OF (1402-1460). English nobleman. The eldest son of Edmund, 5th earl of Stafford, he became earl in 1403, and served Henry V in France. Being a grandson of Thomas, duke of Gloucester, he received various high appointments, including that of captain of Calais. In 1444 he was made duke, and helped to bring about the fall of Humphrey, duke of Gloucester, receiving some of his estates. When the Wars of the Roses began he ranged himself on the side of Henry VI, and was killed in the battle at Northampton, July 10, 1460.

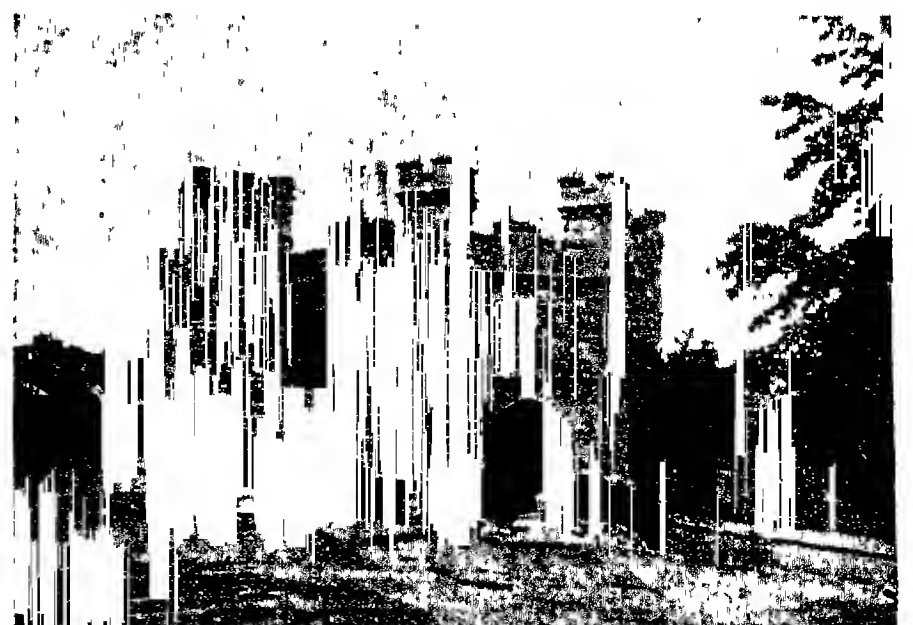
Buckingham, HENRY STAFFORD, 2ND DUKE OF (c. 1453-1483). English nobleman. Son of Humphrey Stafford (d. 1455), eldest son of the 1st duke of Buckingham, he succeeded to his grandfather's titles and estates in 1460. His mother was Margaret Beaufort, a



Henry Stafford, 2nd
Duke of Buckingham

From an old print

descendant of John of Gaunt. Although a Lancastrian, he was recognized by Edward IV as duke, and allowed to marry Edward's sister-in-law, Catherine Woodville. To Richard III he rendered great services, urging the Londoners to make him their king. He went over to the side of Henry Tudor, and raised the standard of revolt in Wales. He was taken and executed, Nov. 2, 1483. His son Edward (1478-1521), the 3rd duke, received his attainted father's



Buckingham. The old gaol in this English market town
Valentine

honours in 1485, and for a time enjoyed high favour with Henry VIII. He subsequently incurred the royal displeasure, and was executed on Tower Hill, May 17, 1521.

Buckingham, GEORGE VILLIERS, 1ST DUKE OF (1592-1628). English courtier. A son of Sir George



George Villiers, 1st Duke of Buckingham

Painting by Jansen

Villiers, he was born at Brookby, Leicestershire, Aug. 28, 1592. Brought to the notice of James I in 1614, his good looks at once raised him to the position of favourite. He was made companion of Charles, prince of Wales, who was eight years his junior, and became devotedly attached to him; to the king the favourite was known as Steenie, while the prince of Wales was Baby Charles. Villiers was made earl of Buckingham in 1617, and duke in 1623. From 1618 onwards he aspired to be the real ruler of the country, and exercised complete control over James and Charles.

Appointed lord high admiral in 1619, he accompanied Prince Charles to Spain, 1623, and achieved momentary popularity by advocating war with Spain. He brought about the mismanaged expedition to regain the Palatinate for the king's son-in-law, the Elector Frederick, and the futile naval expedition to Cadiz (1625), and was only saved from impeachment by the dissolution of Parliament in 1626. In 1627 he led the expedition to the isle of Ré, which failed to relieve Rochelle. In 1628 he was fiercely attacked by Parliament, but retained the complete confidence of the king. While preparing to lead another expedition to Rochelle, he was assassinated at Portsmouth, Aug. 23, 1628, by a half-crazed officer named Felton. He was buried in Westminster Abbey. Consult *The Romance of George Villiers*, P. Gibbs, 1930.

Buckingham, GEORGE VILLIERS, 2ND DUKE OF (1628-87). English courtier and politician. Born Jan. 30, 1628, he

was the second son of the 1st duke, whom he succeeded in 1628. Brought up with Charles I's children, he was educated at Trinity College, Cambridge, and served on the



George Villiers, 2nd Duke of Buckingham

After White

royalist side in the Civil War. In 1651 his estates were sequestrated, but in 1657 he married the daughter of the parliamentary general Fairfax, to whom most of his estates had been assigned under the Commonwealth.

After Clarendon's fall, which was largely due to him, he was the most influential of the king's advisers. In 1668 he was a chief member of the Cabal ministry, but after attacking Arlington in 1673 he lost favour. Ten years of intrigue followed, including alliance with the Whig dissenters, and support of Titus Oates's popish plot. Buckingham died on April 16, 1687, at Kirby Moorside, Yorkshire, and was buried in Henry VII's chapel, Westminster Abbey.

Satirised as Zimri in Dryden's *Abalom and Achitophel*, he was a wit, a writer of verses, the author of a play called *The Rehearsal*, 1671, and a dabbler in chemistry. In a dissolute age his scandals were conspicuous, and his conduct in the case of the countess of Shrewsbury, whose husband he had killed in a duel, provoked the censure of the House of Lords in 1674. See *Life*, Lady Burghclere, 1903.

Buckingham and Chandos, RICHARD GRENVILLE, 2ND DUKE OF (1797-1861). British politician and



Richard Grenville, 2nd Duke of Buckingham and Chandos

From a painting by Mee

author. Only child of the 1st duke, whom he succeeded in 1839, he was born Feb. 11, 1797, and educated at Eton and Oriel College, Oxford. Known as Earl Temple from 1813-22, and as marquess of Chandos 1822-39, he was Conservative M.P. for Buckinghamshire 1818-39, and lord privy seal 1841-42. He introduced into the Reform Bill of 1832 the so-called Chandos clause, extending the franchise in counties to £50. In 1847 he left the country to escape his creditors, but afterwards returned and died in London, July 29, 1861. His *Memoirs of the Courts and Cabinets of George III*, 1853-55; of the Court of England from 1811 to 1820, 1856; of George IV, 1859, and of William IV and Queen Victoria, 1861, supply valuable political information.

Buckingham and Normanby, JOHN SHEFFIELD, 1ST DUKE OF (1648-1721). English politician. Born April 7, 1648, he was the son of the 2nd earl of Mulgrave, whom he succeeded in 1658. After serving in the navy and the army, he was made a privy councillor and

lord chamberlain by James II in 1685, and created marquess of Normanby by William III in 1694. In 1702 he was appointed lord privy seal by Anne, and created duke of Buckingham and Normanby, and in 1710-11 was lord president of the council. He wrote poems, essays, and plays, and was a patron of Dryden and Pope. His *Account of the Revolution* and his essays *On Poetry* and *On Satire* are noteworthy. On the accession of George I he was deprived of all his offices. He died in London, Feb. 24, 1721, and was buried in Westminster Abbey.

Buckingham, JAMES SILK (1786-1855) British journalist and traveller. He was born at Flushing, near Falmouth, Aug. 25, 1786,

went to sea as a boy, and was captured by the French. In 1818 he founded *The Calcutta Journal*, as compensation for the suppression of which

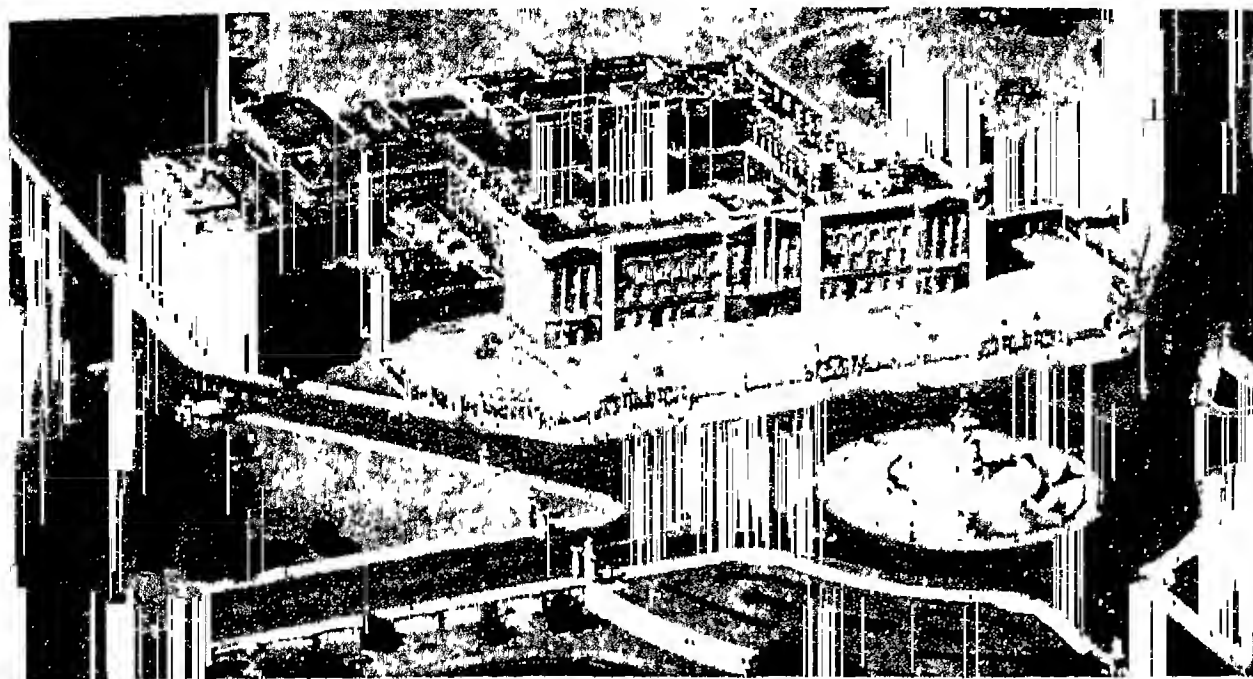


James Buckingham, British journalist

in 1823 he in after years was given a pension. In the intervals of extended travel he was M.P. for Sheffield, 1832-1837. He started *The Oriental Herald*, 1824; *The Athenaeum*, 1828; and other periodicals. Of his four volumes of autobiography two were published in 1855. He died in London, June 30, 1855.

Buckingham Palace. Royal residence in London. Built in 1703 by a Dutch architect for John Sheffield, duke of Buckingham, it was acquired by George III in 1762 for £28,000. Reconstructed 1825-36 in the Palladian style, from designs of Nash, it had a new wing added, 1846-47, by James Blore. In 1856 the ballroom was added, measuring 111 ft. by 60 ft. In 1913 a new front was built from designs by Sir Aston Webb. It is of a straightforward Renaissance design in Portland stone. A cornice is carried round the building, and a balustraded balcony projects from the first floor.

The principal state apartments are the throne room, the drawing room, and the picture gallery. The picture gallery, 180 ft. long and 20 ft. wide, contains many works of the English, Dutch, Flemish, and French schools, Reynolds, Wilkie, Lely, Rembrandt, Rubens, Claude Gellée, and Watteau being worthily represented. Part of the collection was got together by George IV; it was enriched by the gallery of Sir Francis Baring.



Buckingham Palace, London. Air view showing general design, with the wing added in 1846 on the left, facing Buckingham Palace Road, the Queen Victoria Memorial in front of the main façade, and Constitution Hill on the right

The palace faces the W. end of the Mall, the Victoria memorial (unveiled in 1913) immediately in front of it. British monarchs from Victoria onwards have made it their London headquarters and it has been the scene of many demonstrations of popular loyalty to the crown. Edward VII was born here (1841) and died here (1910).

Buckingham Palace was bombed nine times during the Second Great War, the first occasion being Sept. 9, 1940. A time bomb shattered the swimming pool and caused damage to the Queen's suite and the Chinese Chippendale room, in addition to burying historical and family documents.

Buckinghamshire or **BUCKS.** Inland county of England. Bounded N. by Northamptonshire, E. by Bedfordshire, Hertfordshire, and Middlesex, S. by the river Thames, and W. by Oxfordshire, its greatest length is 53 m., greatest breadth 27 m., and its area 749 sq. m. Next to the Thames, with its tributaries the Colne and Thame, the Ouse is the largest river.

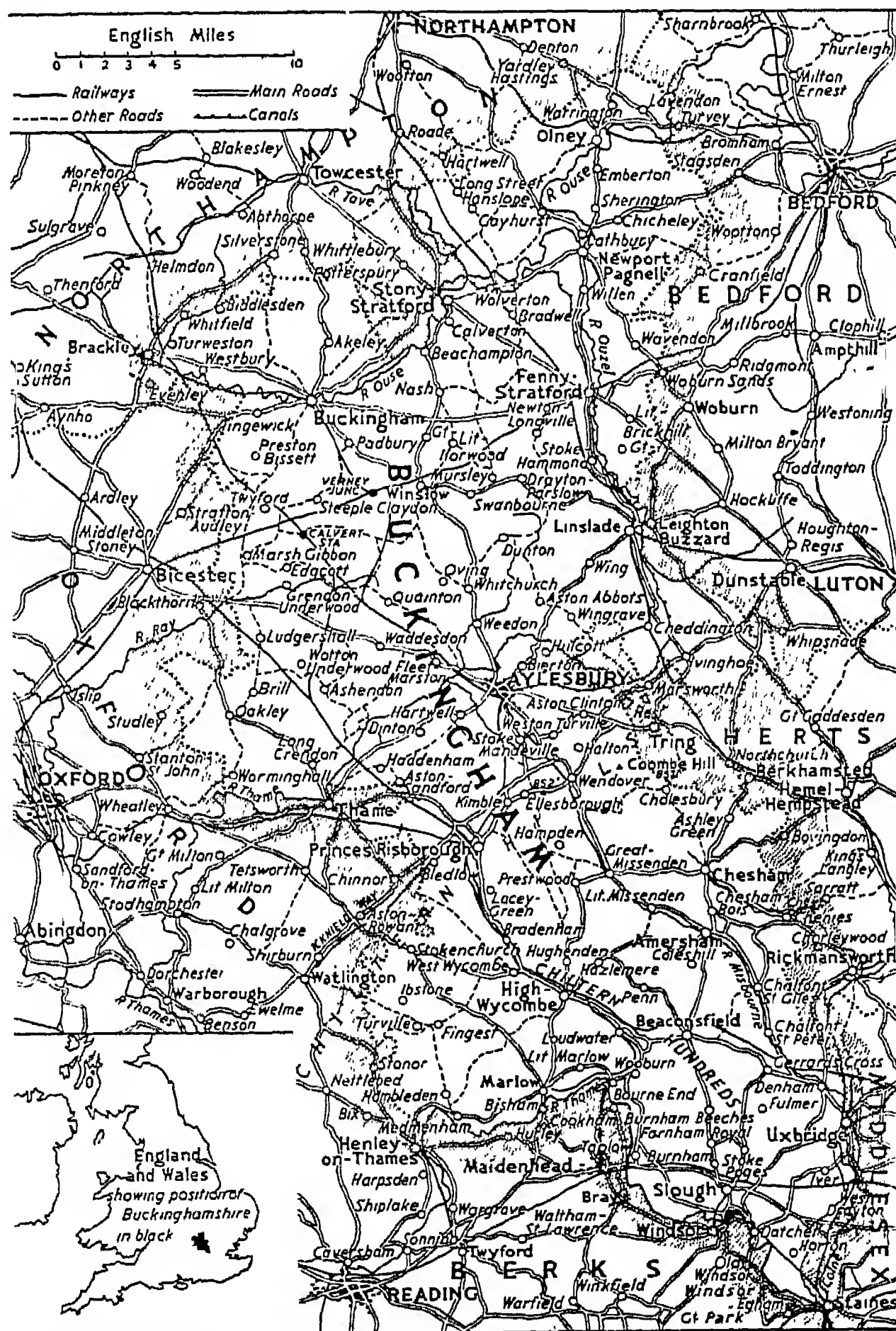
Mainly undulating, the surface is relieved by the Chiltern Hills, which enter at the S.W. part of the county and take a N.E. direction through woods and valleys, culminating in Haddenham Hill (857 ft.). Most of the soil is under cultivation, wheat and oats being the principal crops, while the Vale of Aylesbury is noted for its dairy produce, ducks, and fine breed of sheep. Beech and oak trees are plentiful, the wood of the former being utilised in making brush-stocks, chairs, etc.; straw-plaiting and the manufacture of thread-lace, shoes, and paper also provide considerable employment. Chalk, limestone, and fireclay are the chief minerals quarried.

The county is served by railways, including the Metropolitan

line, and the Grand Union Canal. The county has four county constituencies, and one borough constituency (Eton and Slough). The

district of Chiltern Hundreds is within the county; Aylesbury is the county town; others are High Wycombe or Chipping Wycombe, Slough, Buckingham (the former county town), and Chesham. Eton College lies near the S. border. There are remains of British and Roman occupation. At Hampden is Hampden House, the residence of John Hampden, who was buried in the church. Pop. (1951) 386,164.

LITERARY ASSOCIATIONS. At Horton, near the Middlesex border, Milton lived as a young man and wrote *Comus*, *L'Allegro*, and other lyric poems (memorial window in the church); at Chalfont St. Giles, where he finished *Paradise Lost*, his cottage remains, and has many contemporary contents. At Jordans William Penn is buried. Beaconsfield was the home of Edmund Waller, born at



Buckinghamshire. Map of this county in the South Midlands of England

Coleshill, near Amersham, of Edmund Burke, and of G. K. Chesterton, all of whom died there; it gave his title to Benjamin Disraeli, who lived and is buried at Hughenden near Wycombe. At Bradenham Disraeli lived when a young man, and there his father Isaac D'Israeli is buried.

At Stoke Poges, the scene of Gray's *Elegy* in a Country Churchyard and the place of the poet's burial, Coke wrote his *Institutes*. At Marlow Shelley wrote *The Revolt of Islam*. A house in the market square of Olney was for ten years the home of William Cowper. Thomas Scott, the Biblical commentator, was rector of Aston Sanford; and Sir William Herschel carried on his astronomical investigations at Slough.

Buckinghamshire, EARL OF. English title held by the family of Mercer-Henderson. John Hobart, head of an old Norfolk family, cr. baronet 1611, was the ancestor of another John Hobart, made a baron in 1728 and earl of Buckinghamshire in 1746. When the 2nd earl died in 1793 the Norfolk estates, including Anne Boleyn's residence, Blickling Hall, passed to his daughter, who married the marquess of Lothian; but the title continued with the Hobarts. The fourth earl, Robert (1760-1816), secretary for war and the colonies, 1801-04, gave his name to Hobart, Tasmania. The 5th earl succeeded in 1824 to the Buckinghamshire estates of the Hampdens and added that name to his. The names Mercer-Henderson were added to Hobart-Hampden in 1903, and these last two were dropped in 1938. John, 8th earl (b. 1906), succeeded his father in 1930.

Buckland, HENRY SEYMOUR BERRY, 1ST BARON (1877-1928). British financier. Eldest son of John Mathias Berry, of Merthyr Tydfil, he began his working life as a pupil teacher, and later entered real estate business. He became associated with the large commercial enterprises of D. A. Thomas (later Lord Rhondda). Lord Buckland became chairman of Guest, Keen, and Nettlefolds, and was director of other companies. Eldest brother of Lord Camrose (*q.v.*) and Lord Kemsley (*q.v.*), he was created a peer, 1926. He met his death while riding, May 23, 1928, and as he left no son the title became extinct.

Buckland, FRANCIS TREVELYAN (1826-80). British naturalist. Born Dec. 17, 1826, he was a surgeon. Appointed in 1867 an inspector of fisheries, he did valuable work



Francis Buckland
British naturalist

in discovering and remedying the causes of the decline of the salmon and other fisheries. For many years he acted as honorary pathologist to the London Zoological Gardens. He also established the museum of economic pisciculture at South Kensington. He died Dec. 19, 1880.

Buckland Abbey. House near Tavistock and 11 m. N. of Plymouth, Devon, founded as a Cistercian monastery in 1278 by Amicia, widow of Baldwin de Redvers, earl of Devon. At the Dissolution it was given by Henry VIII to Sir Richard Grenville. His grandson, the Sir Richard immortalised by his last fight in the *Revenge*, sold the property to Sir Francis Drake, in whose family it remained for many years. Acquired by the National Trust in 1948, the house was opened in 1951 as a Drake naval, and west country museum.

Buckle (Lat. *buccula*, part of a helmet covering the mouth and cheeks). Metal fastening or clasp. Buckles were largely used in the Middle Ages as a fastening for sword belts, girdles, etc., and were often richly jewelled and otherwise ornamented.

Shoe buckles came into existence early; they appear on a monumental brass of 1376 at Lynn. The 16th century chronicler Holinshed inveighs against the wearing of silver shoe buckles by priests. In 1666 Charles II endeavoured to introduce a so-called Persian dress, in

which shoe strings were replaced by shoe buckles, but only the buckles found favour. They remained popular and became very elaborate.

A very thriving buckle industry sprang up in Birmingham, but at the French Revolution a general reaction against buckles set in, the republican Jean Marie Roland being the first person to appear at the French court with shoe strings.

Buckle, GEORGE EARLE (1854-1935). British journalist. Born June 10, 1854, at Twerton Vicarage, Bath, the eldest son of Canon Buckle, he was educated at Winchester and New College, Oxford. He was made fellow of All Souls and was called to the bar. In 1880 Buckle joined the staff of *The Times*, became editor in Dec., 1884, and retired in Aug., 1912. He wrote vols. iii-vi, pub. 1914-20, of the official *Life of Disraeli*, begun by W. F. Monypenny. He died March 13, 1935.

Buckle, HENRY THOMAS (1821-62). British historian. Born at Lee, in Kent, Nov. 24, 1821, the son of a shipowner, he was educated privately. A remarkable linguist, by 1850 he could speak seven languages and read in nineteen. His studies bore fruit in 1857,

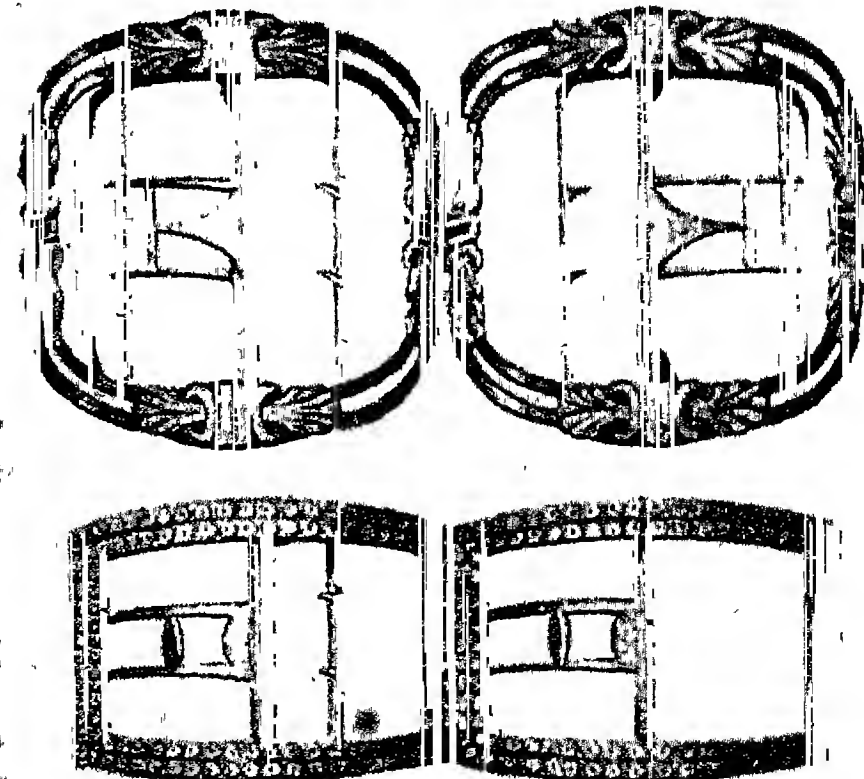
when the first volume of the *Introduction to the History of Civilization in England* appeared, followed by a second volume in 1861. Physically exhausted by incessant hard work, he travelled in the East in search of health, but died at Damascus, May 29, 1862. Buckle was one of the great chess players of his time.

His *History of Civilization*, only a fragment, brought Buckle great fame in his lifetime, and despite the advance of historical method it remains illuminating. *Consult* *Life*, A. H. Huth, 1880; *Buckle and His Critics*, J. M. Robertson, 1895.

Buckler. Term for a shield, especially one that is used for parrying



Henry T. Buckle,
British historian



Buckle. Ornate shoe buckles of the eighteenth century. The lower example is ornamented with paste

blows. The word is derived from Fr. *bouclier*, in allusion to the *boucle*, or boss, in the centre. The term is also used of the covers fitted to the hawse-holes of a ship to keep out water; of a movable cask-head which presses down the contents of the cask; and of the protective covering or shields of some animals. See Shield.

Bucklersbury. Narrow street in the E.C. district of London, between Cheapside and Walbrook. Its name is derived from the Bokerels family, one of whom became mayor in the 13th century. During the reign of Queen Elizabeth I, Bucklersbury was occupied by a number of fashionable apothecaries and grocers, and at Cornet's Tower, once used as a money exchange by Edward III, the Grocers' Company met before the erection of the first Grocers' Hall. The street is mentioned in Shakespeare's *Merry Wives of Windsor*. Its S.E. extremity was destroyed by enemy action, May 10, 1941.

Buckler's Hard. Village of Hampshire, England, on the Beaulieu river, New Forest. In the days of the wooden navy, it was a centre for building warships. Oak was felled in the New Forest and turned into ships at Buckler's Hard, where the slips still remain.

Buckley, ARABELLA BURTON (1840-1929). British writer on natural history. Born at Brighton, Oct. 24, 1840, she was secretary to Sir Charles Lyell 1864-75. She was the wife of Dr. Thomas Fisher. She lectured on natural science 1876-83. Her books, chiefly on popular science for the young, include *Eyes and No Eyes*, 1901. She died Feb. 9, 1929.

Buckmaster. The first high-powered training aircraft in the world. It was produced by the Bristol Aeroplane Co. of Great Britain in 1945 after the Second Great War. An all-metal midwing monoplane, it had two radial engines each developing over 2,500 h.p. and driving four-bladed feathering airscrews. The maximum speed was 352 m.p.h. Weight was 33,700 lb.; length, 46½ ft.; height, 17½ ft.

Buckmaster, STANLEY OWEN BUCKMASTER, 1ST VISCOUNT (1861-1934). British lawyer and politician. Born Jan. 9, 1861, he was educated at Christ Church, Oxford. He was called to the bar at the Inner Temple in 1884, and became a K.C. in 1902. He was Liberal M.P. for Cambridge 1906-10, and for Keighley 1911-15. In 1913 he was knighted on becoming solicitor-general and in 1915 he

was appointed lord chancellor. He resigned the chancellorship on the fall of the Asquith ministry in Dec., 1916. He was an advocate of divorce law reform. Created a viscount in 1933, he died Dec. 5, 1934, and was succeeded by his son (b. 1890).

Buckner, SIMON BOLIVAR (1823-1914). American soldier. Born in Kentucky, April 1, 1823, he saw service in the Mexican War, and on the outbreak of the Civil War joined the Confederate army. Attaining the rank of lieutenant-general, he took a prominent part in the battles of Murfreesboro and Chickamauga. He was governor of Kentucky 1887-91, and in 1896 candidate for the U.S. vice-presidency. He died Jan. 8, 1914.

Bucknill, SIR ALFRED TOWNSEND (b. 1880). British judge. He was educated at Charterhouse and



Sir Alfred Bucknill,
British judge

Trinity College, Oxford, and was called to the bar in 1903. He served in the First Great War as a staff officer in France, Egypt, and Ireland. Becoming a bencher of the Inner Temple in 1928, Bucknill took silk in 1931 and in 1935 he was knighted, and appointed a judge of the high court in the probate, divorce, and admiralty division. In 1945 he was made a lord justice of appeal, retiring 1951.

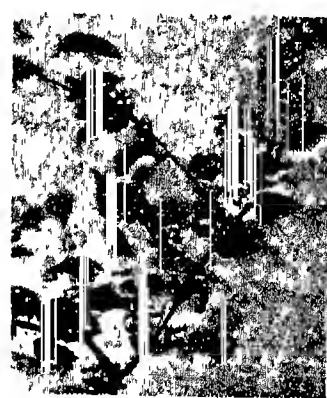
Buckram. Loosely woven cotton or linen fabric stiffened with size, used for stiffening clothes, for bonnet shapes, and in book-binding. In the 15th century the name buckram was given to a fine costly stuff used for clothing and for church vestments and furniture. The name was sometimes used for a quilt or any quilted material. The word is variously derived from Bokhara, from Bulgaria, from Arabic *abu qiram* (cloth with inwoven figures), and from Italian *bucherare* (to pierce full of holes).

Buckrose, J. E. (d. 1931). British author. She was born at Hull, and educated there and at Dresden, and married Robert Falconer Jameson. In a rapid succession of novels, short stories, and sketches, she admirably delineated the simple rustic and urban folks of her native Yorkshire. Her works include *Down Our Street*, 1911; *Aesop Dancing*, 1930. She died Aug. 9, 1931.

Buckskin. Soft yellowish or greyish leather made from the skins of bucks, sheep, or other animals, used for gloves and other articles of clothing. The term is also applied to a strong twilled woollen cloth, of which buckskin breeches are generally made.

Buckstone, JOHN BALDWIN (1802-79). British actor and dramatist. Born at Hoxton, London, Sept. 14, 1802, he made his first appearance on the London stage at the Surrey, Jan. 30, 1823, as Ramsay in *The Fortunes of Nigel*. In 1827 he joined D. Terry's company at the Adelphi. Between 1833-39 he performed in several farces of his own at the Haymarket during the summer, returning each winter to play low comedy at the Adelphi. In 1840 he visited the U.S.A., returning in 1842 to the Haymarket, of which he was manager 1853-76. He died Oct. 31, 1879. His best known dramas are *Victorine*, *Green Bushes*, and *The Flowers of the Forest*; his farces include *Good For Nothing*. His favourite characters were Tony Lumpkin, Bob Acres, Sir Benjamin Backbite, Mawworm, and Scrub.

Buckthorn (*Rhamnus catharticus*). Shrub of the family Rhamnaceae, a native of Europe, N.



Africa, and Siberia. It is much branched, the branches often ending in a sharp point; the leaves are oval, with sharply toothed edges; and the flowers small, yellow-green, in clusters from the axils of the leaves. The fruits, though commonly known as berries, are drupes, i.e. akin in structure to plum and cherry, the contained seeds being separately enclosed in a stone. They are about ¼ in. across, black when ripe, and possess purgative qualities.

Another species, the alder buckthorn (*R. frangula*), inhabiting the same countries, differs in that the branches are unarmed with spines, the leaves are broader, without teeth, and with the veins parallel. In their unripe state the fruits yield a green dye.

Buckwheat (*Fagopyrum esculentum*). Crop-plant belonging to the dock and knotgrass family (Polygonaceae). The heart-shaped leaves, red stems, and small crowded pinkish-white flowers give the plant an attractive appear-

ance. "Buck," a corruption of German *Buche* (beech), refers to the fruits, which resemble minia-



Buckwheat, crop-plant of the dock family

ture beech-nuts. The seed is drilled in the middle of May or the beginning of June. In Great Britain this crop is grown for green manuring, sheep-feed, and food for pheasants. The fruits are good food for horses, and, when cracked, for milch cows, pigs, and poultry. In other countries buckwheat is used for making porridge and cakes.

Bucolic (Gr. *boukolikos*, pertaining to herdsmen). Term applied to pastoral poetry. The idylls of Theocritus and the eclogues of Virgil are classical examples. In England the term was often used for the artificial country-life poetry of the 18th century.

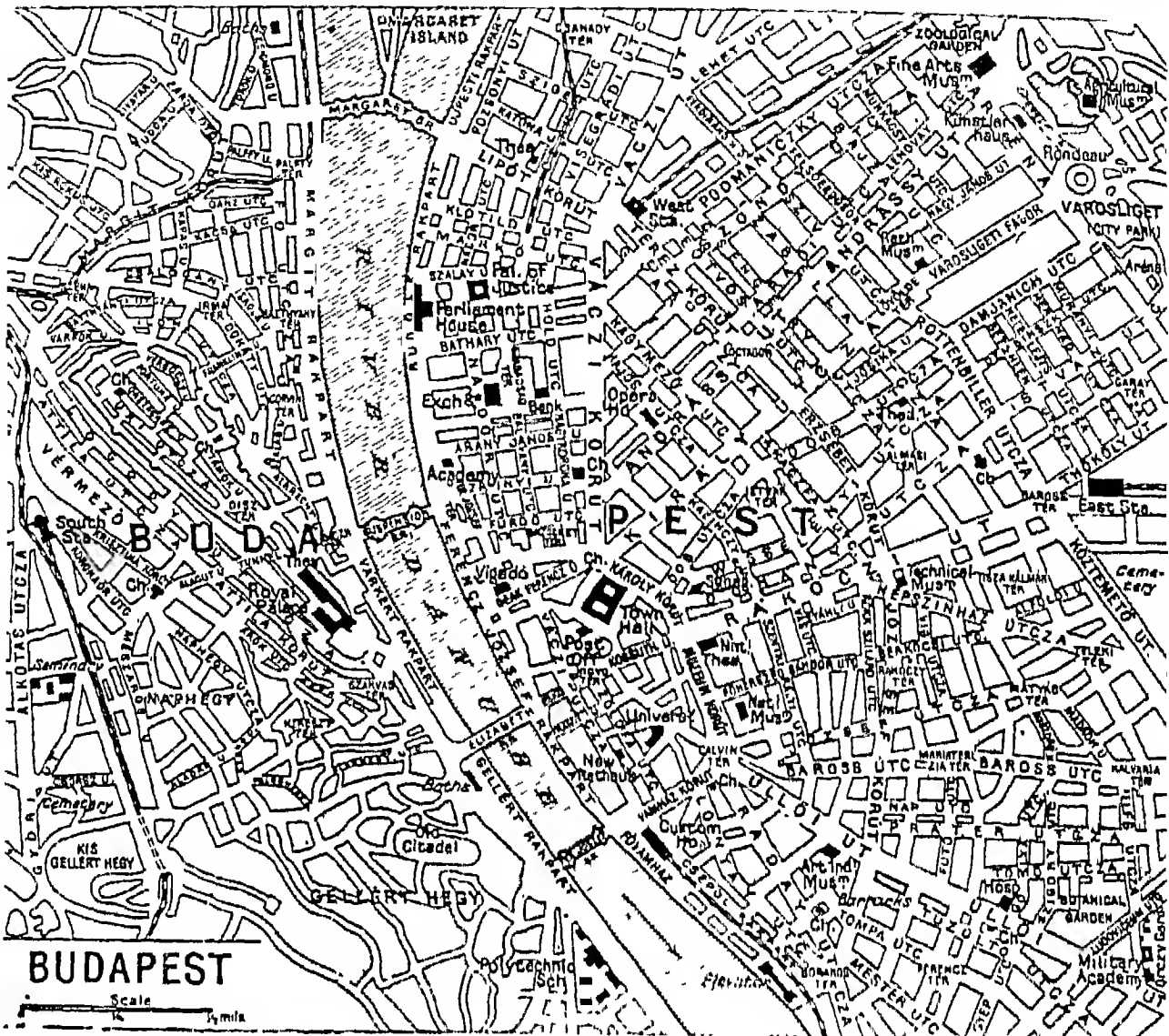
Buczacz. Town of Ukraine S.S.R. On the Strypa, 47 m. by rly. N.E. of Stanislavov, in an agricultural district, it had a fine town hall, and manufactured vinegar and potash. The Poles and Turks signed a treaty here Oct. 18, 1672. The Russians took the town from the Austrians June 8, 1916. Then in Austria-Hungary, in Poland after the First Great War, Buczacz is in the area occupied by Russia in 1939, and incorporated in the Ukraine (*q.v.*). It was in German possession from 1941 to 1944.

Bud (Fr. *bouton*, button, bud). Strictly speaking, a condensed shoot with its leaves, in embryo, packed closely together. It is covered as a rule by tightly wrap-

ping scales to prevent excessive transpiration, the effects of rapid temperature changes, and the admission of fungus spores and bacteria. Often, as in the horse-

formed in miniature, and protected by bracts or special developments of the sepals.

Budafok. Town of Hungary. It is situated 15 m. by rly. S.W.



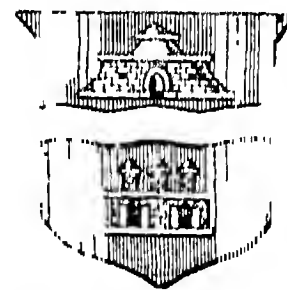
Budapest. Map of the capital of Hungary. The towns of Buda and Pest were incorporated into one city in 1872

chestnut and poplars, the bud-scales are coated with a gummy varnish which softens in the spring sunshine and allows the bud to expand. Buds are produced in the axils between leaf-stalk and stem or branch, where until the fall of the leaf they are protected by the base of the leaf-stalk. In the plane tree the bud is entirely hidden in a hollow of the leaf-stalk. Sometimes there are no enveloping scales, but the outer leaves or leaf-stalks are modified to serve the same end; in the wayfaring tree the buds are naked, but the flat outer leaves are covered with cottony hairs.

When buds expand into shoots in spring, the scales are thrown off, leaving scars. If in autumn these scars are looked for and their distance from the tip of the shoot measured, the season's growth of that shoot can be accurately ascertained. Similarly, flower-buds have all the parts

of Budapest, of which it is virtually a suburb. It is a centre of the wine trade. Pop. (est.) 20,000.

Budapest. Capital of Hungary. On the Danube, 132 m. S.E. of Vienna (163 m. by rly.) it consists of two parts, originally separate towns: Buda, on the W. bank, built over a series of small hills and rising sharply from the



Budapest city arms

river, Pest in a flat plain on the E. bank; the two incorporated to form the city of Budapest in 1872. Until the Second Great War Buda remained the seat of government; the more important government ministries and foreign embassies were located there. Pest developed as the commercial, industrial, and intellectual centre of Hungary. All the seven bridges over the Danube were destroyed in the Second Great War; six were replaced, and two others built.

The inner town of Pest is outlined by a ring of boulevards on the site of the old town wall; beyond them is a semi-circle of outer boulevards, far beyond which the town has advanced. Within these concentric rings lie



Buds of various trees. 1. Dormant buds of beech, lime, hazel, and hawthorn. 2. Winter buds of horse-chestnut. 3. Bursting horse-chestnut buds. 4. Buds of walnut tree

the main streets, the commercial districts, the museums, and the theatres. A series of quays stretches $1\frac{1}{2}$ m. beside the river, lined by cafés and hotels with several imposing buildings which include the Hungarian houses of parliament, built in 1883. Two fine streets, the Üllői Ut and Andrásy Ut, lead to Városliget, the beautiful public park of Budapest. On the southern outskirts is a cemetery containing the tombs of Kossuth, Déak, and other national heroes.

Some 60 p.c. of all Hungarian industrial plants are concentrated in Budapest; they include steel and engineering factories, textile mills, chemical plants, food-processing factories and flour mills, breweries, distilleries, wine presses, and factories making glass, tobacco, china, motor cars, and leather.

Budapest is an important spa, with mineral springs and baths, and a free public health scheme. The town is divided into 22 administrative units, each with its health centre. Strategically, Budapest is the key of the middle Danube, and is the converging point of many railway and river routes. Pop. (1949) 1,781,085.

Buda was a Roman colony, the ancient Aquincum, the capital of

Lower Pannonia. In the 9th century the Magyars entered the Danube plain, and the kingdom of Hungary grew up round the city, which was destroyed by the Mongols in 1241, but rebuilt by Bela IV c. 1250. From then until the Turkish conquest in 1526 it was the residence of the Hungarian kings. After sustaining six sieges, it was captured from the Turks in 1686. It was stormed by the Hungarians, who set up a revolutionary diet in Pest, in 1849, during the 1848-49 revolution. Up to the 18th century Pest was of little importance, but near it, on the Ríku plain, the national assemblies of the Hungarians were held. In 1867 Pest was made the capital of Hungary.

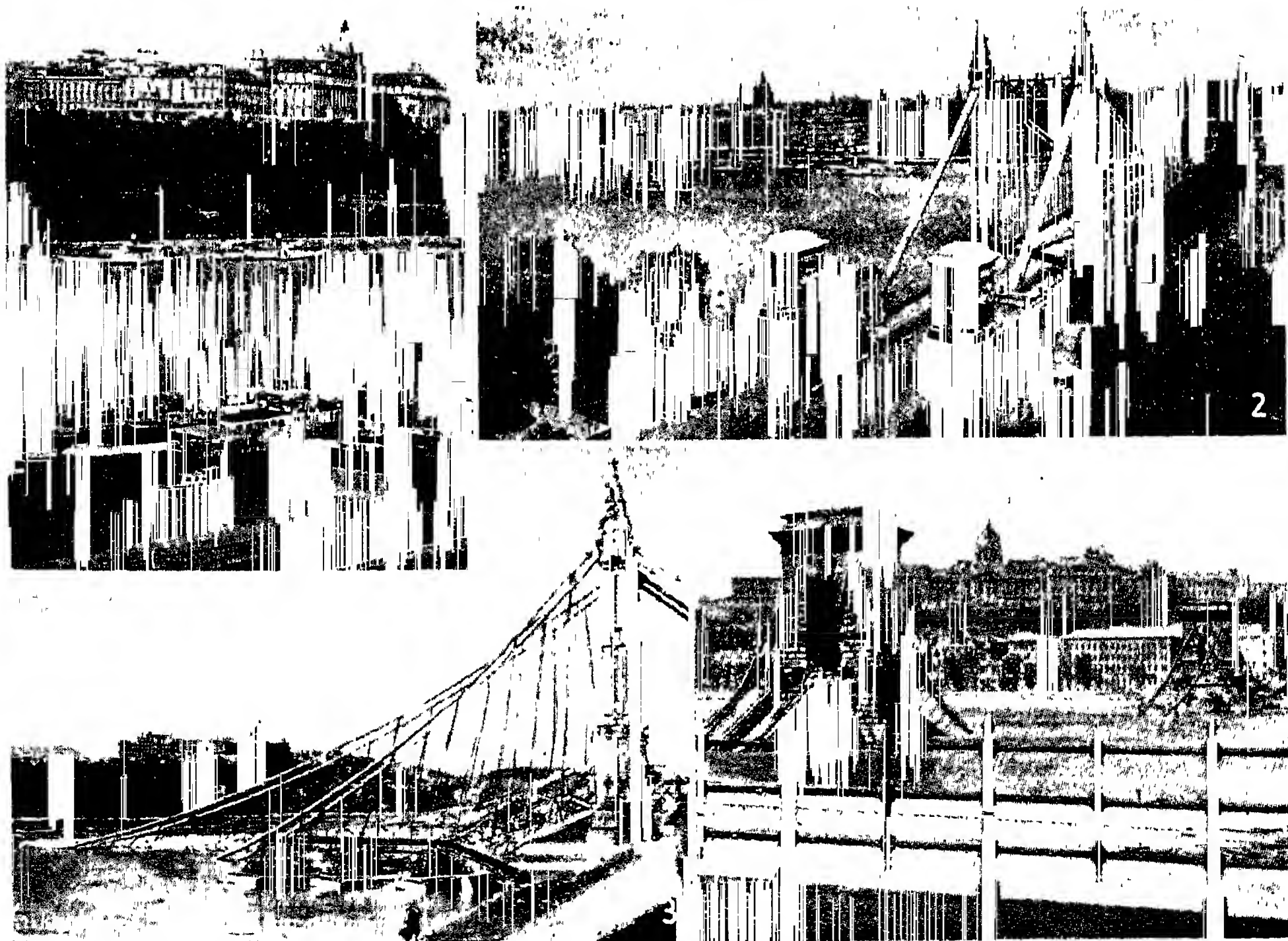
Budapest was very badly damaged in the Second Great War. After repeated bombing during 1944 by the Allied air forces, it was encircled by the Russians by Dec. 26, 1944, and fighting was going on in the suburbs. The Germans turned every houseblock into a fortress, and savage hand-to-hand fighting took place, the Germans eventually retreating to the heights of Buda where they held out until Feb. 13, 1945, by which time 80 p.c. of Buda, including the royal

palace, the castle, the old church, and most of the embassies and government offices, lay in ruins, and 50 p.c. of Pest had been destroyed. Extensive reconstruction took place after the war. Budapest was again the scene of violent fighting in 1956 when Russian troops and tanks entered the city after a Hungarian rising against the Communist regime.

Budaun or **BUDAON**. Town and district of India. In the Rohilkhand division of Uttar Union, the town is 38 m. S.W. of Bareilly. Founded traditionally by Budh, an Ahir prince, c. 905, it was an important centre of Mughal administration, and was a centre of disturbance in the Mutiny of 1857. Pop. (1951) 53,521.

The district is a level, fertile tract watered by the Ganges and its affluents, area 1,996 sq. m. Main crops are wheat, millet, barley, mustard, cotton, and sugar. Pop. (1951) 1,251,152.

Buddha. The name by which Gautama (c. 563 - c. 483 B.C.), founder of Buddhism (*q.v.*) was known after his death. The word has, on his own authority, a much wider meaning. He claimed merely to be one of a series of Buddhas, past and yet to come.



Budapest: pre-war and post-war. 1. View across the Danube of the royal palace, built in the 18th century. 2. Elizabeth bridge, which consisted of one mighty span, a masterpiece of engineering. 3. Remains of Elizabeth bridge, which was destroyed by the retreating Germans in 1945. 4. Ruined suspension bridge, with the damaged palace in the background

Buddh Gaya. Village of Bihar, India, 40 m. S.W. of Bihar. The traditional resting-place of Gautama, founder of Buddhism, it contains the peepul tree (Bo or wisdom tree) beneath which he attained enlightenment, and the remains of a temple built by King Asoka in the 3rd century B.C.

Buddhism. Philosophical system enabling man to live in a changing world which developed into a great world faith. It was founded by Gautama Buddha, also called Sakyamuni, the wise one of the Sakya clan: Siddhartha, the successful one; and I'athâgata, one who has reached the truth. He was born about 563 B.C., and died some

disappointment. Seven years after he had set about the quest, while sitting in meditation under a sacred tree, afterwards known as the Bo (knowledge) tree, the vision of the true way came to him.

This was his hour of illumination, and from that time forth he became the Buddha, the wise or the enlightened one. He saw now for the first time the evil, the cause of all suffering, and also the means by which it was to be overcome. At first he resolved to be a Buddha himself, enjoying alone the blessedness which came to him after he had reached the goal of all his aspirations. But the god Brahma visited him and laid it upon his

mind that he was to be a Buddha to others, preaching the deliverance which had come to his own soul. His followers, chiefly of the intellectual and wealthy class, grew rapidly.

Buddhism has from the outset shown an extraordinary power of accommodating itself to its environment. Its scriptures, none of them regarded as inspired, vary with the country. Buddhism has, however, assumed four principal forms: Buddhism proper, that of Burma and especially of Ceylon; Lamaism, the Buddhism of Tibet; Foism, from Fo, the Chinese form of Buddha, the Buddhism of

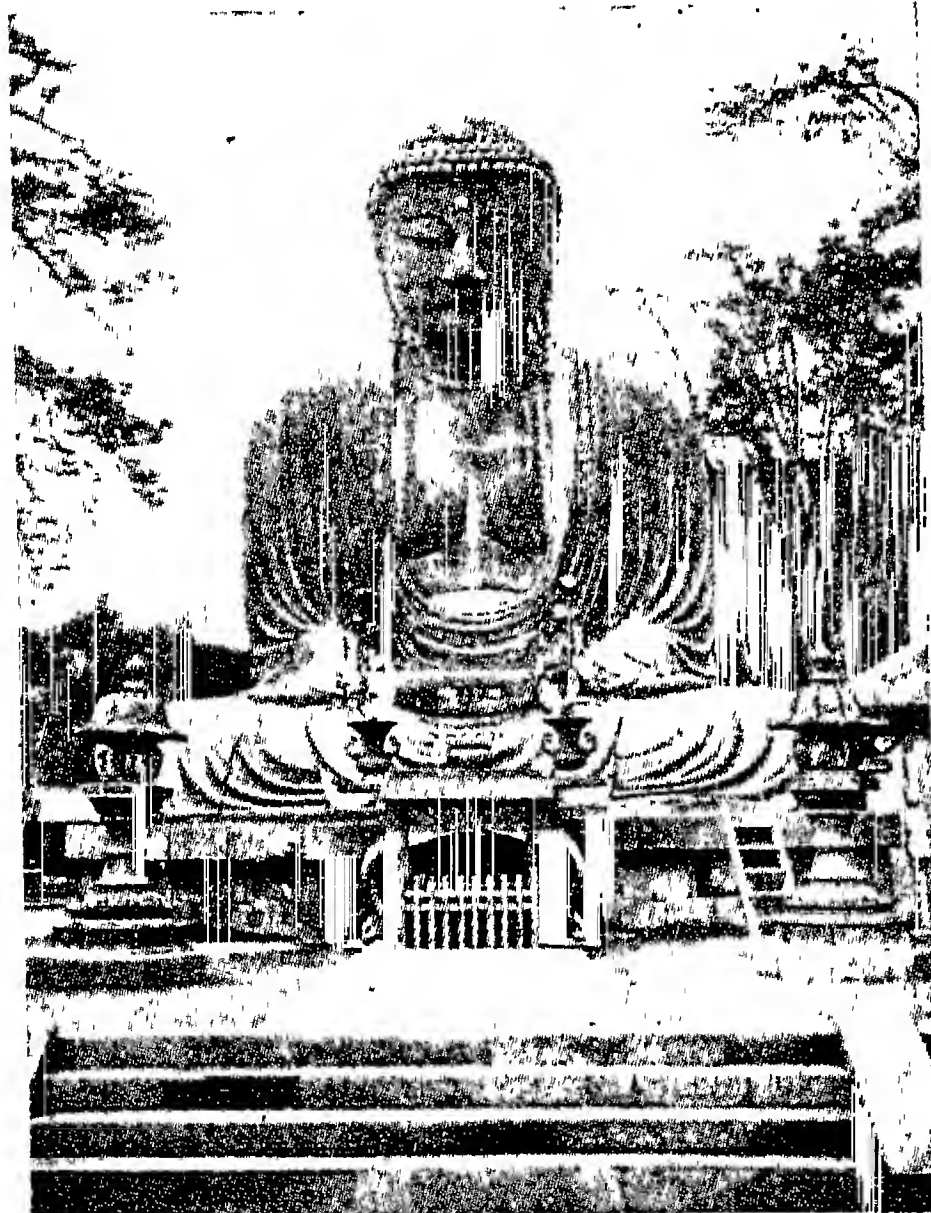
the Vinaya-Pitaka, or basket of discipline, containing rules for moral conduct and religious usage; the Sutta-Pitaka, or basket of doctrine, which, in five treatises called Nikayas, deals with questions of doctrine, the Triratna, or so-called Buddhist Trinity, the Buddha, the Doctrine, and the Samga or Church; the Abhidhamma-Pitaka, or basket of metaphysics, which treats of ethical and philosophical questions. To these must be added many commentaries.

The bible of Lamaism, in Tibet, is probably at least 50 or 60 times as large as the Christian canon, and there are innumerable commentaries on it. The canon of Foism gives a large place to magic and other superstitions. The bible of Japanese Buddhism preaches a religion which is almost as much Shintoism as Buddhism.

Buddhist Philosophy

Buddhism has no theology proper, for it ignores the existence of gods and has no place for sacrifice, prayer, worship, or for a priesthood, which these require. Its philosophy is the impersonal pantheism of the Upanishads, and to the same source it owes its doctrines of rebirth (transmigration of souls), Nirvana, etc., though it modified them to suit its own presuppositions. On the whole, however, it is correct to say with A. Weber that Buddhism is a protest against Brahmanism, especially as the latter is set forth in the Brahmanas, not in the Upanishads. Buddha and his earliest followers rejected the following Brahmanic principles: the authority of the Vedas and the codes based on them; the theology, ritual, and priesthood of the Brahmanas; and the doctrine of caste, which was not entirely, however, rejected by Buddha. Moreover, Buddhism lays the greatest stress upon correctness of life, i.e. upon the moral as distinct from the ritual element in religion.

In the Four Noble Truths forming part of Buddha's first sermon at Benares, we have the genuine Buddhist creed in a nutshell. They are as follow: That suffering is universal, no man being free from it from birth to death. That the cause of this suffering is desire, or longing, this leading to rebirth and the continuance of desire and misery. That deliverance from suffering is to be obtained through the suppression of desire, the absence of passion of every kind; through that quiet mental state which is satisfied and has no thirst for what it has not. That this result is to be obtained by pursuing the holy eight-fold path,



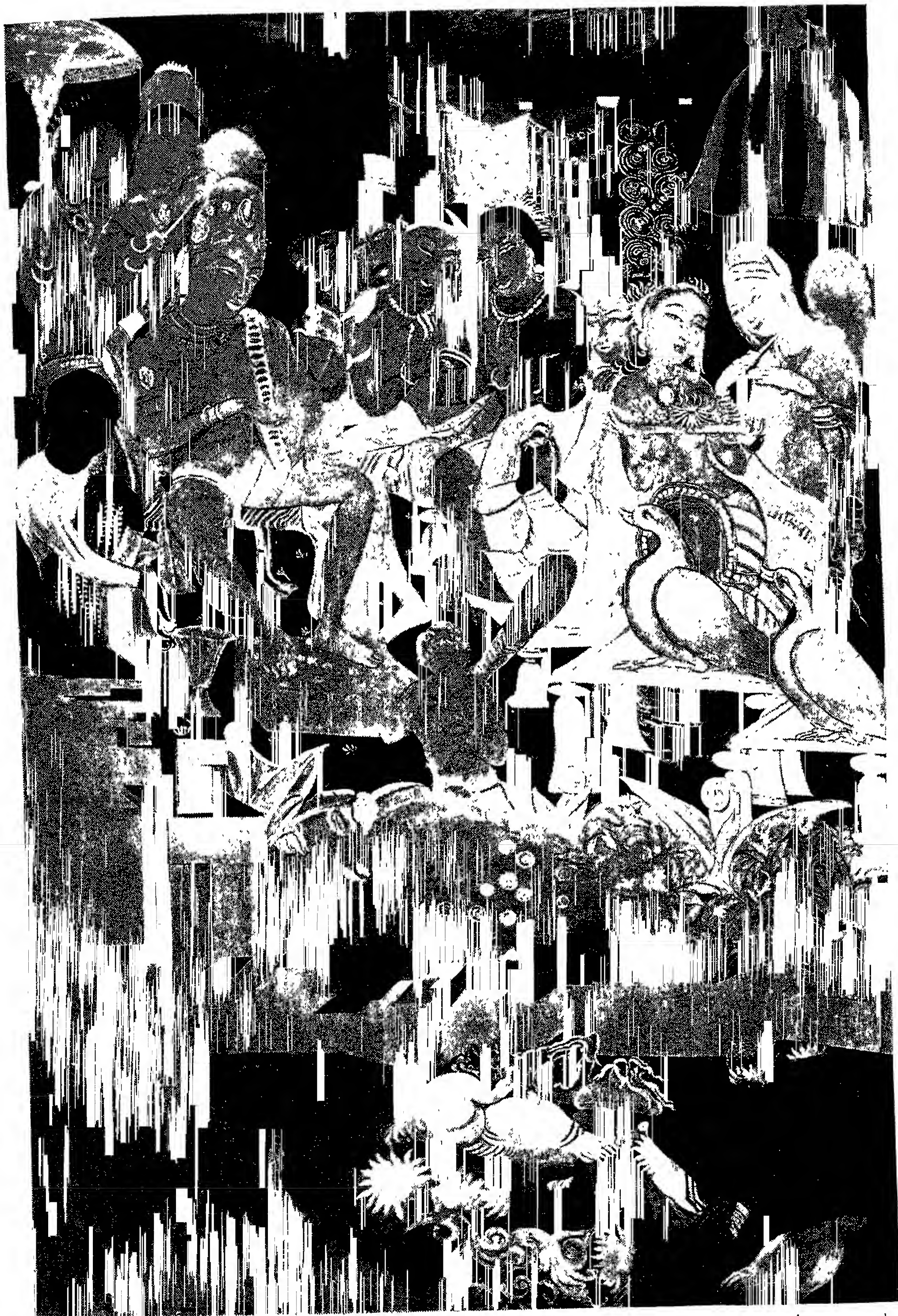
Buddhism. The great bronze Buddha at Kamakura, Japan. It is 49 ft. 7 ins. high, the face is 8 ft. 5 ins., the length of the nose 3 ft. 9 ins. The eyes are of pure gold

eighty years later. His father was chief of a Rajput clan which occupied territory corresponding to Oudh and the adjoining district of S. Nepal, not far from the southern slopes of the Himalayas. When about 28 he married, and a year later his son, Rahula, was born.

Almost immediately after the birth of his son Gautama left his family, and thenceforward lived a wandering life, seeking the satisfaction of his deep soul cravings in all directions and from all the religious teachers he could meet. He tried hypnotism, but the knowledge and the peace of mind that he longed for did not come to him. He then turned to self-mortification, and with five others fasted almost to death. This also ended in

China; and the Buddhism of Japan, a mixture of true Buddhism and of the native Shintoism.

Each of these principal divisions of Buddhism has its own bible. The bible or canon of southern Buddhism, i.e. of Burma and Ceylon, was written in Pali (a dialect of Sanskrit, probably Gautama's mother tongue) and is the oldest and most genuine of the Buddhist scriptures. The Pali bible is called Tipitaka (in Sanskrit Tripitaka), meaning the three baskets. The Pali canon, which forms a part of the other and larger canons, is about the same size as the Christian Bible; but if the very numerous repetitions are included, it is about three times its size. The "three baskets" are the following:



This picture, reproduced from a plate published by the India Society, is from a copy of one of the many drawings and paintings made during A.D. 450-650 on the walls of the Ajanta Caves (formerly in the state of Hyderabad, included in 1956 in the reorganized state of Bombay)

BUDDHIST ANTIQUITIES: THE KING OF BENARES HONOURS THE GOLDEN GEESE

To face page 1522



This beautiful Chinese ceramic statue of a Lohan, a follower or apostle of Buddha, dates from the 10th century A.D. It is 46½ inches high and was found at I-chou, in Hopei (formerly Chihli) province. It is one of the treasures of the British Museum

BUDDHIST ANTIQUITIES: FIGURE OF A LOHAN

To face page 1523

namely, right belief, right aspiration, right speech, right conduct, right means of subsistence, right aim and effort, right memory, right meditation. The goal which Buddhism sets before a man as the *summum bonum* is called Nirvana, of which there are two stages: first, that impassive satisfied state which may be attained in this world; secondly, the more perfect Nirvana which comes only after physical death.

Buddha formed a monastic order which in certain externals has a likeness to the Franciscan friars. Entrance into the Samga, as it was called, was carefully safeguarded and the conditions of membership were very rigid. The members were called Bhikshus or beggars, since they had to beg for their living. Each one had to carry with him a bowl, to dress in a yellow robe, and to go bareheaded.



Buddhist Antiquities. Maya and her son Buddha, depicted by an Indian artist

In later times an order of nuns, Bhikshunis or begging women, was established.

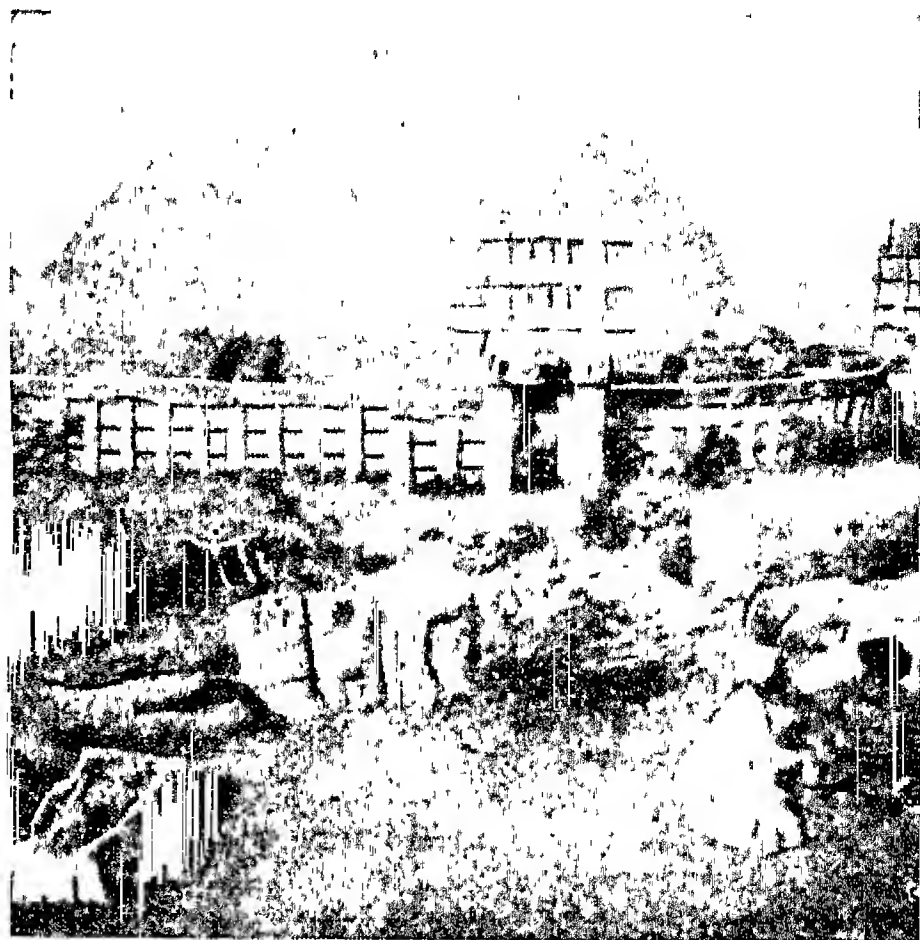
The ethical standard in Buddhism was a very lofty one. It assumed the absolute equality of all men and the duty of showing respect and even kindness to every living being. The following five rules of conduct are binding upon all Buddhists, whether or not they belong to the Samga: No living being is to be killed. No one is to take what has not been given him. Adultery is strictly forbidden. No man is to utter an untruth. All intoxicating drinks are to be avoided. Members of the Samga must also keep the five following regulations: No food to be eaten after midday; no one to be present at dancing, singing, musical, or dramatic performances; wreaths, scents, ointments, and personal ornaments not to be used; high or broad beds not to be lain on; and no one to be the owner of gold or of silver.

The older and more original Buddhism is called Hinayana, or the narrow way. The Buddhism of Tibet, China, and Japan is designated Mahayana, or the broad way. Those who avoid both extremes are said to follow the Madhyamayana, or the middle way. The number of Buddhists in the world is about 100,000,000. Like Christianity and Islam, Buddhism is a missionary religion.

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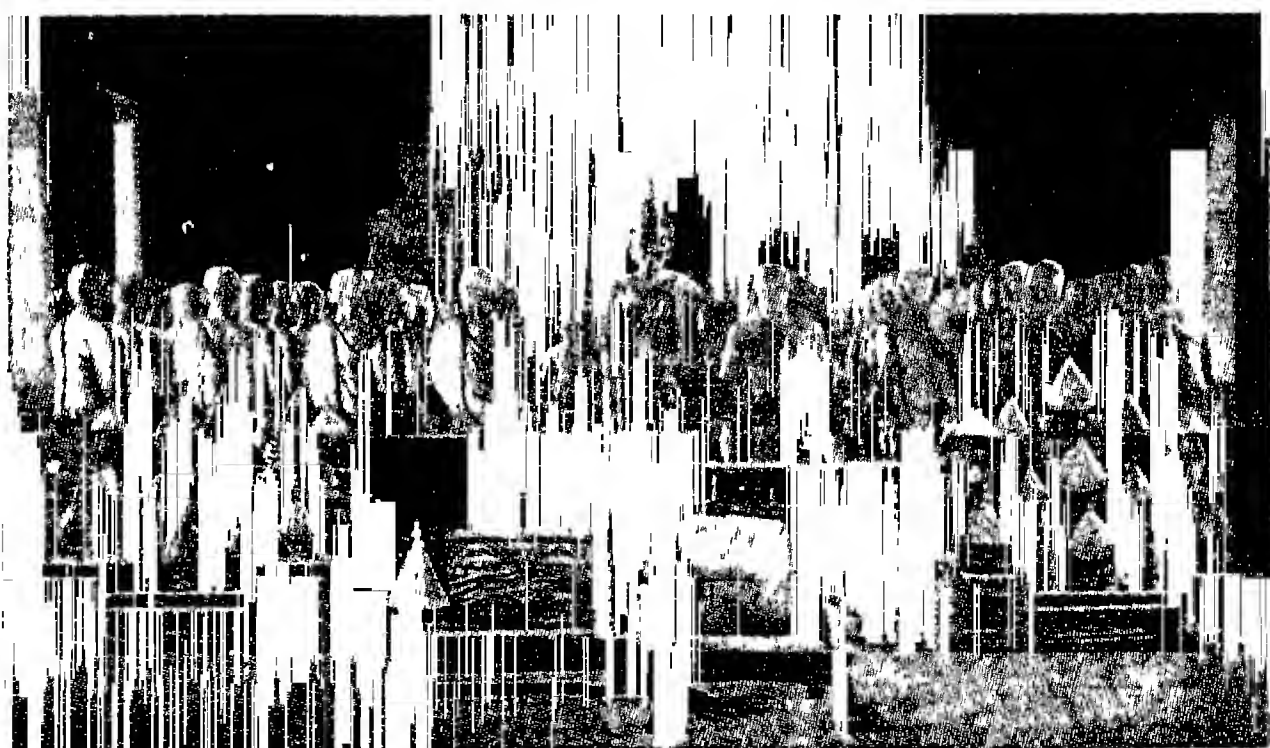
Buddhist Antiquities. Material remains of Buddhism in past ages. Reputed relics of Gautama Buddha are widely dispersed and associated with much legendary detail. These include the eight sacred hairs at Rangoon and the alms-bowl at Kandahar. The canine tooth, *dalada*, conveyed to Ceylon in A.D. 310, and destroyed at Goa in 1560, is represented by an ivory substitute at Kandy. Well-attested fragments of Gautama's bones were found near Peshawar in 1909, in a stupa relic-casket deposited, about A.D. 100 by Kanishka. Among still older reliquaries of the Buddha or his followers are a ruby-studded



Buddhist Antiquities. The Sanchi Tope at Bhilsa, India: a memorial structure two thousand years old

gold casket from Bimaran, 1st century B.C., now at South Kensington, and a steatite vase of the 4th century B.C., or earlier, with the oldest known Indian jewelry and inscription, found in 1897 at Piprawa, close to Buddha's birthplace.

The conversion of Asoka, about 250 B.C. inaugurated eight centuries of Buddhist predominance in India. His foreign missionaries established the faith in Ceylon and his propaganda ultimately carried it to other lands. Fourteen ethical rock-edicts were incised by him on rocks at Girnar in Kathiawar and other remote places. nearer home he engraved seven pillar-edicts on monolithic pillars, one of which is now at Allahabad. Gandharan influence stereotyped the canonical Buddha-image and through it the forms of the Bodhisattvas and other Buddhist manifestations. Colossal examples of these images are rock-cut, as at Bamian in Afghanistan, 173 ft. high: plastered brick on rock, as



Buddha and his pupils. Statue group of stone figures in the Siamese pagoda of Wat Suthat in Bangkok, Siam

at Pegu in Burma, recumbent, 181 ft. long; sculptured stone, as at Kwangchokji in Korea; cast bronze, as at Nara in Japan; gilded metal, as at Urga in Mongolia; and gilded wood, as at Kyoto in Japan.

In Chinese Turkistan, where Le Coq in 1904 found Buddhist interments in monastic garb, Stein's expedition (1906-8) collected 500 paintings, 50 fresco panels, and many other works. His painted silk banners, 9th-10th century, now in the British Museum, are of great importance, comparable with the kakemono at Kyoto, 48 ft. long, depicting the Buddha's death. A collection of objects stored at Nara since the 8th century fully illustrates early Japanese Buddhism. The 9th century hill-temple at Borobudur, in Java, has 1,600 Buddhist scenes in stone.

From various localities the ritual accessories of Buddhism are represented by bells, drums, praying wheels, and the like. As the building of a stupa earns merit, votive models abound on many sacred sites, such as the monolithic dagoba, 4 ft. high, at Anuradhapura in Ceylon.

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Budding. Gardening term for the propagation of a scion or offspring of a choice flower or fruit upon a sturdy stock. Apples, pears, and roses are the most frequent subjects of the operation. In the first case the stocks selected are usually those of the wild crab-apple, the pear, or the quince, while roses are invariably budded upon the wild briar or dog-rose of the hedgerows, the French paradise, or the Manetti stock.

Generally speaking, July is the best month for budding fruit trees, and August for roses, when both scion and stock are in full growth. The practice of budding early in May has fallen into disuse, as buds treated at this period begin to shoot before they have become sufficiently permanently attached to the stock.

Take a sharp budding-knife, and cut out a bud from the skin, starting from above with a horizontal cut, and curving the blade of the knife slightly inwards to the stem, just behind the junction of the bud, and then outwards again. This will bring away the bud attached to a piece of bark of a semi-elliptical shape, known as the shield. The stock should be prepared for its reception by making

two cuts in the bark with the budding-knife, one horizontal and one vertical, in the shape of the letter T, and large enough to enable the scion to be fitted into the wound. The bark of the scion should be gently turned back with the budding-knife and the bud inserted and pressed into position. The bark should then be turned back again, and the whole result of the operation bound securely with some soft material, such as wool, worsted, raffia, or bast. In the autumn the stem of the stock which bears the bud may be cut back to a point just above it. See Grafting.

Buddle. Mechanical appliance used for concentrating metalliferous sands, or ores that have been crushed. The appliance is used for the separation of valuable constituents from worthless earthy matter residing in such sands or ores. The term buddle, an old Cornish miner's expression, was originally applied to a contrivance consisting of a long open-top wooden box, slightly inclined in the direction of its length, on the bottom of which the sands were washed and separated by a stream of water allowed to flow through the box. The inclination of the box was regulated according to the character of the sands to be treated.

There are two general classes of buddles, and a considerable number of modifications of each. The two classes may be distinguished as the convex and concave, according to the form of the bed of the machine, or as outward flow and inward flow, according to the way the sands on the bed move.

The essential features of the former are shown in Fig. 1, which is the older type, and of the latter in Fig. 2. In the former the bed, *a*, of the machine rises to the centre, where it takes the form of a sharp cone, *b*. A vertical shaft, *d*, rotated by suitable gearing, has a number of radial arms, *c*, *c'*, attached to it. From these arms depend distributors, *e*, *e'*, which may be in the form of brushes or simple pieces of stout fabric attached to metal or wooden beams. The clearance of these distributors in regard to the bed of the machine and the pressure with which they rest on the accumulating ore and spread it, are determined by the balance weights beneath *c*. The sands are fed into the centre of the machine through the launder, *g*, and fall round the cone on the bed, where they are spread by the rotation of the distributors until a predetermined depth of sands has been reached.

The effect is that the heaviest and richest sands remain near the centre of the machine, while the poorest sands and the mere earthy matter collect at the outside. When the bed is filled, the machine is stopped and a rough division is made into three zones. Of these the outer zone is dug out and usually thrown away as worthless; the intermediate zone will probably be put aside to receive a further budding; the central zone, containing the richest portions of the ore, will be passed on to the next stage of treatment. Provision is made for removing the surplus water as it accumulates, and for a supply of fresh water to assist in the washing or separation of the ore.

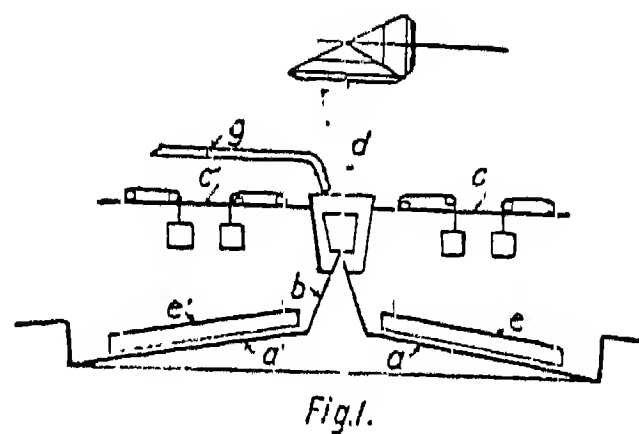


Fig. 1.

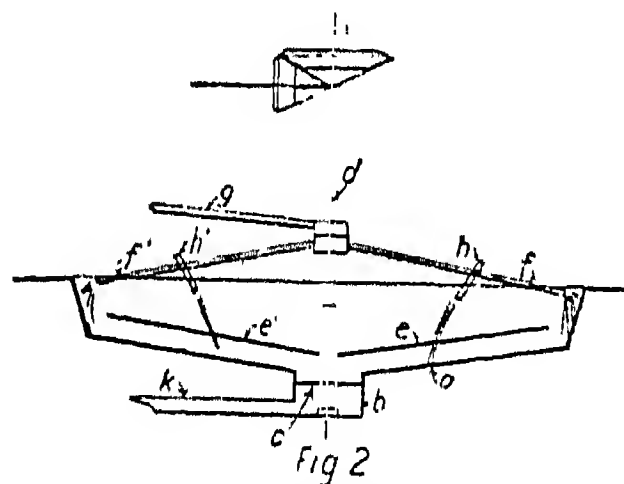


Fig. 2.

Buddle. Fig. 1 gives a diagram of the convex buddle, and Fig. 2 of the concave buddle

In Fig. 2 the bed rises to the rim. The sands enter at the margin of the bed, and are distributed by the rotating launders, *f*, *f'*, which receive them from a central feeding pan into which they are conveyed by the fixed launder, *g*. The spreading arms are at *e*, *e'*, and may be in various forms. Both the rotating launders and the spreading arms receive motion from the vertical shaft, *d*; *c* is a diaphragm or plunger, the position of which in the well, *b*, admits of regulation. It fits the well sufficiently to prevent any premature escape of sands, but allows surplus water to escape. The grading of the sands on the bed is opposite to that in the machine shown in Fig. 1; the rich sands remain towards the outside of the bed, the worthless collect at the centre. When the operation is finished, the rich and the intermediate zone are dug out, and

usually disposed of as already described. The central or worthless zone is washed away by streams of water directed upon it from the spouts *h*, *h'*, the diaphragm *c* being raised to permit a free discharge.

In both classes of machines the rotating arms make only a few revolutions per minute, while the rate of rotation and the time given to the operation are varied according to the fineness or other characteristics of the sands. These machines are often of very large size, the bed being from 18 ft. to 30 ft. in diameter. See Copper; Gold; Tin.

Bude OR BUDEHAVEN. Resort and small seaport on the N. coast of Cornwall, England. It is 18 m. N.N.W. of Launceston, and is on the rly. Situated amid beautiful scenery at the mouth of the river Bude, it carries on a little fishing. The Bude Canal, built 1819-26 to carry sea-sand for fertiliser, was closed 1898 except for one short stretch. Pop. (1951) 3,360.

Budé, GUILLAUME (1467-1540). French scholar called by Erasmus "the prodigy of France." He left money for the publication of improved texts of classical works, and the scholarly Budé editions, by French or foreign authors, continue to be published. Budé was born in Paris of a rich and noble family, and until he was 23 lived a life of pleasure. He then took to study, attracted by the beauty of the Greek language and civilization, and began writing. His principal book was *De Asse et Partibus Ejus*, 1514, a study of ancient coins and measures. He also published *Commentarii linguae Graecae*, 1529, and other massive works. Francis I appointed Budé head of his library (the nucleus of the Bibliothèque Nationale), and he took advantage of the king's favour to found the Collegium trilingue, afterwards the Collège de France. He died in Paris Aug. 13, 1540.

Budejovice A Czecho-Slovak town. See Česke Budejovice.

Budenny, SIMEON MIKHAIL-VITCH (b. 1876). Russian soldier. The son of a Cossack farmer in the Don basin, he entered the tsarist army as a cavalry trooper in 1903. After the revolution of 1917 he was elected president of the divisional Soviet of the Caucasian troops, but did not join the Communist party until 1919. As cavalry general, he defeated Denikin's White Army in N. Caucasus in 1920, and organized and assumed command of the Soviet cavalry. In 1932 Budenny, although he had had



Marshal Budenny,
Russian soldier

no formal schooling, graduated with honours from the Moscow military academy. Marshal of the Soviet Union in 1935, in 1937 he was made C.-in-C. of the Moscow district, his main work there being the reorganization of the Red Guard.

Marshal Budenny played a prominent part in Russia's defeat of the Finns in 1940, and was appointed deputy people's commissar for defence. Upon the outbreak of war with Germany he was appointed C.-in-C. of the Russian armies defending Kiev and the Ukraine. As part of Marshal Stalin's "scorched earth" policy, Budenny breached the Dnieper dam in Aug., 1941. During the German thrust to Kharkov in Oct., 1941, Timoshenko took over command from him. He became a member of the presidium of the supreme soviet 1946.

Budge, SIR ERNEST ALFRED THOMPSON WALLIS (1857-1934). British Egyptologist and Semitic scholar, first keeper of the Egyptian and Assyrian antiquities in the British Museum. Born July 27, 1857, he proved himself a brilliant student of Semitic languages while at Christ's College, Cambridge. He became assistant in the department of oriental antiquities at the British Museum in 1883, and in 1894 was appointed keeper of the re-named department of Egyptian and Assyrian antiquities, retiring 1924. He worked on excavations in Egypt and the Sudan during 1897-1905. His works include a standard text of *The Book of the Dead*, 1898, and an Egyptian hieroglyphic dictionary, 1920. Knighted 1920, he died Nov. 23, 1934.

Budge, JOHN DONALD (b. 1916). American lawn tennis player. Born at Oakland, California, he was a schoolboy champion, and in 1937 and 1938, ranked by the U.S.A. its number 1 amateur player, he held the championships of America, Britain, France, and Australia in the space of twelve months, as well as helping his country to take the Davis Cup from Britain. Turning professional, he was victorious in a series of matches against H. E. Vines and Perry and was soon recognized as professional champion. In the

Second Great War he served in the U.S. army.

Budgerigar. Native name for the Australian long-tailed parakeet (*Melopsittacus undulatus*), bred in the U.K. as a pet and for showing. One of the best known measures up to 8 inches from beak to tail tip, and is mainly green and blue, with primrose forehead. Budgerigars should not be confused with love birds.

Budget. Annual statement of a nation's finances made in Parliament by the chancellor of the exchequer. The word comes from the French *bouffette*, a leather bag (Lat. *bulga*), hence a dispatch-box, usually of leather, from which the minister, when making his speech, produces his papers. The word was first used in England about 1760, and has been adopted in many other parliaments.

The budget is an annual statement. In Great Britain the financial year ends on March 31, and the budget is presented in April or May, although supplementary budgets may be required at other times, e.g. 1931, 1939, 1945, in autumn. A budget consists of (1) a statement of the actual revenue and expenditure of the year just past, and (2) an estimate of that for the year to come. The latter is partly conjecture, and in increasing or reducing taxation to make revenue and expenditure approach a balance, the chancellor is said to "budget" for the year. In the U.K. the budget is always introduced in the representative house. Resolutions are passed giving effect to the proposals. They require confirmation by Act of Parliament except that as a matter of convenience a resolution varying or confirming an existing tax is given, for a period of four months, the effect of an Act of Parliament.

Budleigh Salterton. Seaside village of S. Devon, England. It stands 3½ m. E.N.E. of Exmouth, and has a rly. station. It has a 13th century church and old bridges; also bathing and golfing facilities. The river Otter here flows into the English Channel. From the cliffs, 250 ft. high, it is possible to see Portland. The red pebbly beach is the scene of Millais's picture *The Boyhood of Raleigh*, that great seaman having been born at Hayes Barton, near by. Pop. (1951) 3,953.

Budrum OR BUDRUN. Seaport of Asiatic Turkey. It is on the N. coast of the Gulf of Cos, 96 m.

S. of Izmir. It has a small but good harbour, a castle, and the ruins of the ancient city of Halicarnassus, the birthplace of Herodotus, the Greek historian.

Budweis. German name for the Czecho-Slovak town of České Budejovice (*q.v.*).

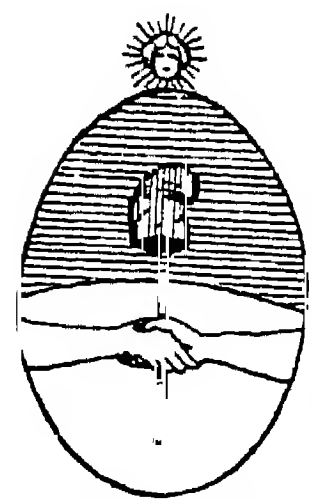
Budyenny OR BUDYONNY. *See* Budenny.

Buenaventura. Pacific seaport of Colombia, with good harbour installations and airport, in Valle dept. It stands on the island of Cascajal in Buenaventura Bay, and is the outlet for the fertile valley of the river Cauca (coffee, sugar cane, cattle) and for the Chocó mining region (silver, gold, platinum). It is a rly. terminus and is connected by road with Bogotá (440 m.). The port was swept by a disastrous fire in 1931, but was rebuilt. Pop. (1951) 54,973.

Buena Vista, BATTLE OF. Fought Feb. 22–23, 1847, between American and Mexican troops. An American force about 5,000 strong, under Zachary Taylor, had seized and strongly fortified a position on the San Juan, a tributary of the Rio Grande. They were attacked by a Mexican force of some 20,000 men, whom they compelled to retreat on the evening of the 23rd. Whittier's poem, *The Angels of Buena Vista*, refers to this battle.

Buen Ayre (Span., good air or wind), OR BONAIRE. Island of the Netherlands Antilles. It lies off the coast of Venezuela, 30 m. E. of Curaçao, is about 30 m. long by 4 m. broad, and has an area of 127 sq. m. It produces timber, salt, donkeys, goats, and cochineal. Pop. 5,100.

Buenos Aires (Span., good air or winds). Largest and most populous prov. of Argentina.



Buenos Aires.
Arms of the province

Bounded N. by the Paraná and Rio de la Plata, and E. and S. by the Atlantic, it covers an area of 118,467 sq. m. Except in the S., where it is traversed by two chains of mts., it is chiefly a level plain watered by the Salado, Negro, and Colorado rivers and many small lakes. Of its 900-m. coastline, about 150 m. are on the Rio de la Plata; there are few good ports, the best being Bahía Blanca and La Plata (Ensenada).

The chief industries are sheep and cattle rearing and the cultiva-

tion of cereals, vines, sugar cane, alfalfa, and tobacco, and other products are phosphates, wool, hides, beef, tallow, horses, asses, and mules. There are large coal deposits. The province is well served by rlys. La Plata (*q.v.*) is the capital. Pop., excluding Buenos Aires city, 4,408,373.

Buenos Aires. Federal capital of the Argentine republic, situated on the S. bank of the Rio de la Plata, 150 m. from the Atlantic, where the river, although 30 m. wide, is comparatively shallow. The city lies on a low plain sloping gradually towards the N., with an average height above sea level of only about 20 ft. The boundaries of the city cover an area of about 80 sq. m., coinciding with those of the federal district, as laid out on Oct. 31, 1867.

In 1778, when Buenos Aires was opened as a port, the pop. was only 24,203. Even in 1855 there were but 90,000 inhabitants. In 1909 Buenos Aires passed the million, and the census of 1914 gave 1,500,000 people. The pop., including that of suburban towns and cities, was estimated in 1955 to be about 3,400,000, making Buenos Aires the largest city S. of the equator, and, after Paris, the largest Latin city in the world.

Rectangular Street Plan

Buenos Aires is well planned from the central point of the Plaza de Mayo, out of which the Avenida de Mayo extends W. as far as the Capitol building. The main artery, which continues to the W. and S.W., is the Avenida Rivadavia. As the city extended in this direction the various subdivisions were built along the Avenida Rivadavia, their right-angle streets conforming to the orientation of the central thoroughfare. The extensions of the city to the N.E. were attached similarly to the main avenue which leads through San Isidro and San Fernando to Tigre. In the centre traffic congestion led to modifications of the original strictly rectangular plan, and from the Plaza de Mayo diagonal avenues were cut both N.W. and S.W. The N. diagonal, the Avenida Saenz Peña, is the axis of commercial life. Government offices are grouped at either end of the Avenida de Mayo; while through the heart of the city runs the broad Avenue 9 July. The smart shops and large department stores spread along the Calle Florida, and the industrial region is located along the valley of the Riachuelo and in the suburb of Avellaneda.

Excellently managed underground rlys., which link the W. part of the city to the centre, reduce street traffic.

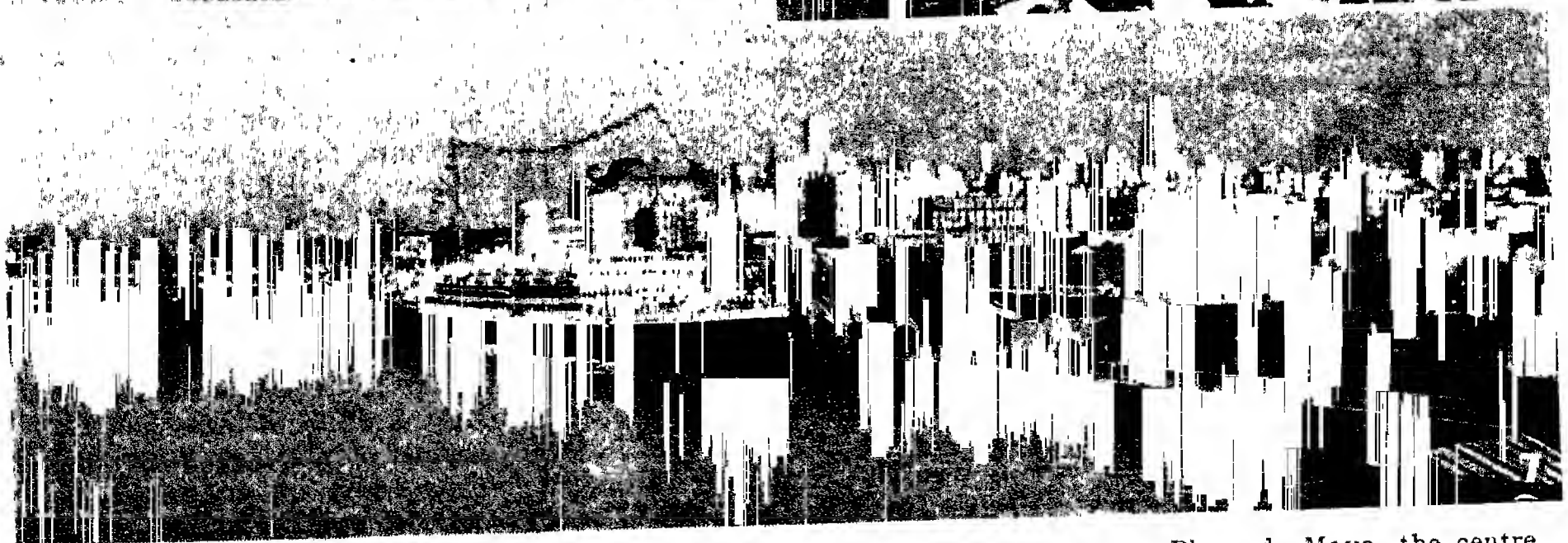
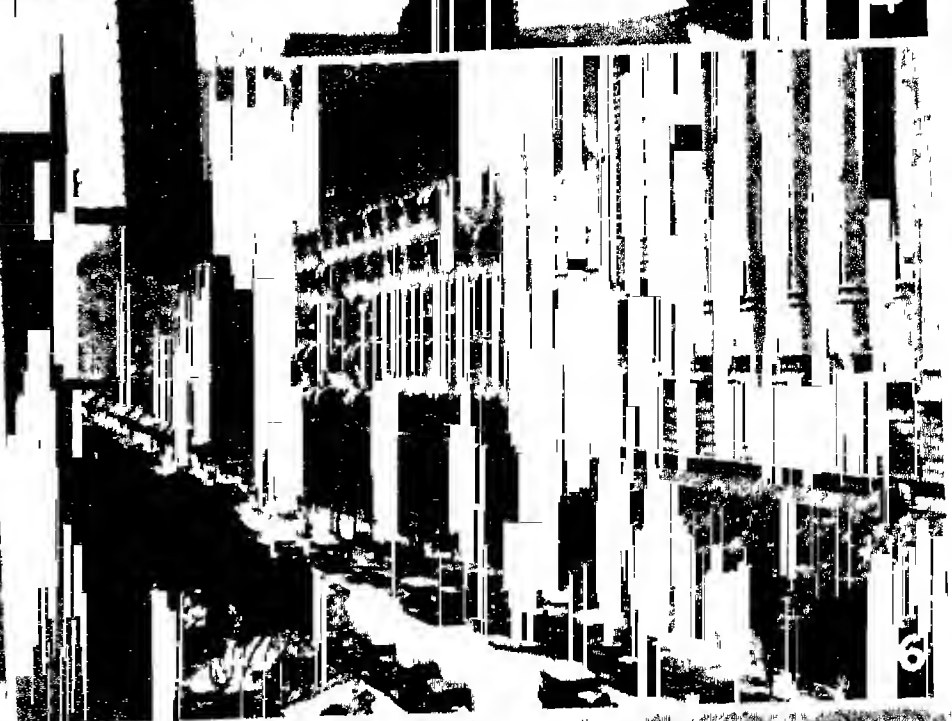
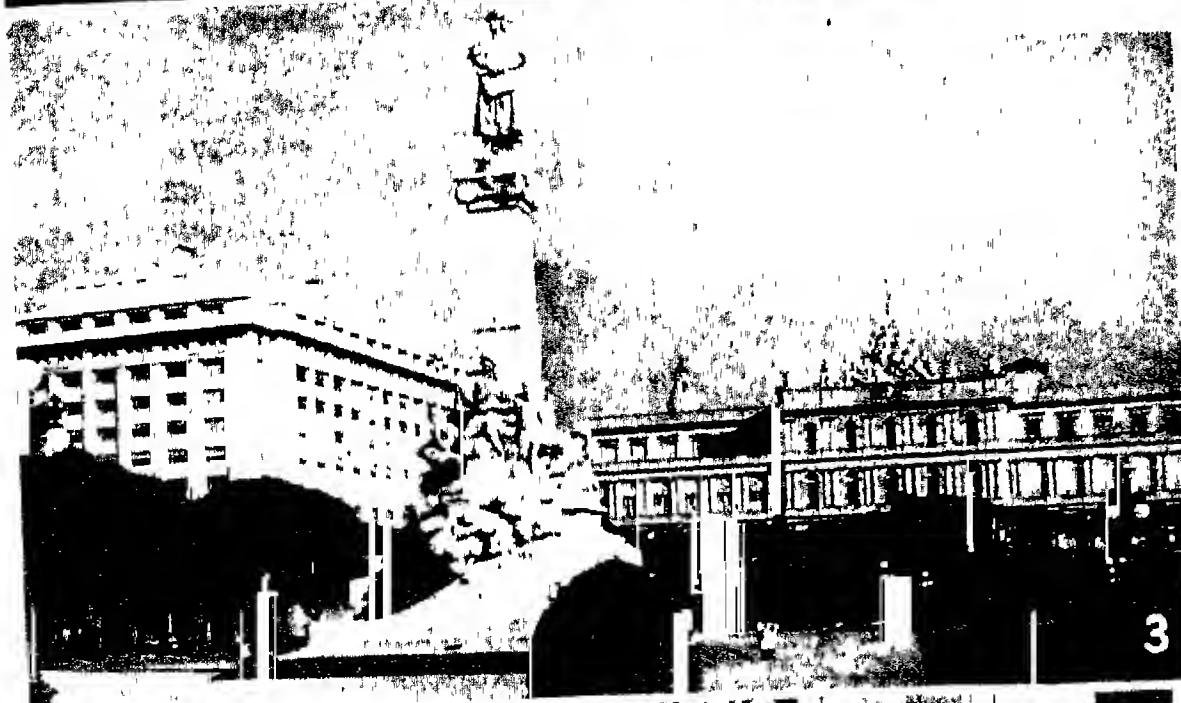
The govt. house on the E. of the Plaza Mayo and called, because of its pink colour, La Casa Rosada, is the official residence of the president and the headquarters of govt. depts. It is notable for its magnificent furnishing, statuary, and libraries. The Cabildo on the W. side of the Plaza was finished in 1711, and was the govt. centre in the days of the Spanish viceroys. In 1940 the original furniture was replaced in the building and it was made a national monument. The congress hall at the W. end of the Avenida de Mayo is a vast edifice in Greco-Roman style of architecture and contains the chambers of the senate and of the deputies. The law courts, facing Calle Talcahuano, are four large central buildings in Grecian architecture. The Mint in Calle Defensa was opened in 1881. The Bolsa de Comercio houses the stock exchange, the foreign exchange, and the general produce market. The Bank of the Nation occupies an entire square in front of the Plaza de Mayo, but the Central Bank on Calle Reconquista holds the gold reserve and controls the issue of paper currency. In the general post office on Avenida Alem and Sarmiento foreign newspapers are on display.

Imports and Exports

Buenos Aires is the centre of the country's railroad systems and air services, with direct trains to Bolivia, Chile, Paraguay, and Uruguay.

Buenos Aires, sole outlet for the pampa, was opened as a port in 1778; the first passenger mole was built in 1885. In 1887 modern docks were begun and subsequently four large new docks were added at a cost of over £5,000,000, capable of handling 5,000,000 tons of shipping annually. There are airports at Morón, General Pacheco, and Ezeiza. More than 80 p.c. of the country's imports pass through the port and 60 p.c. of its exports. Buenos Aires ranks second only to New York among the cities of America in the value of foreign trade, the exports of frozen meats, grain, wool, and livestock being in excess of the imports. The city has extensive meat packing establishments, and the central produce market is one of the largest buildings of its kind in the world.

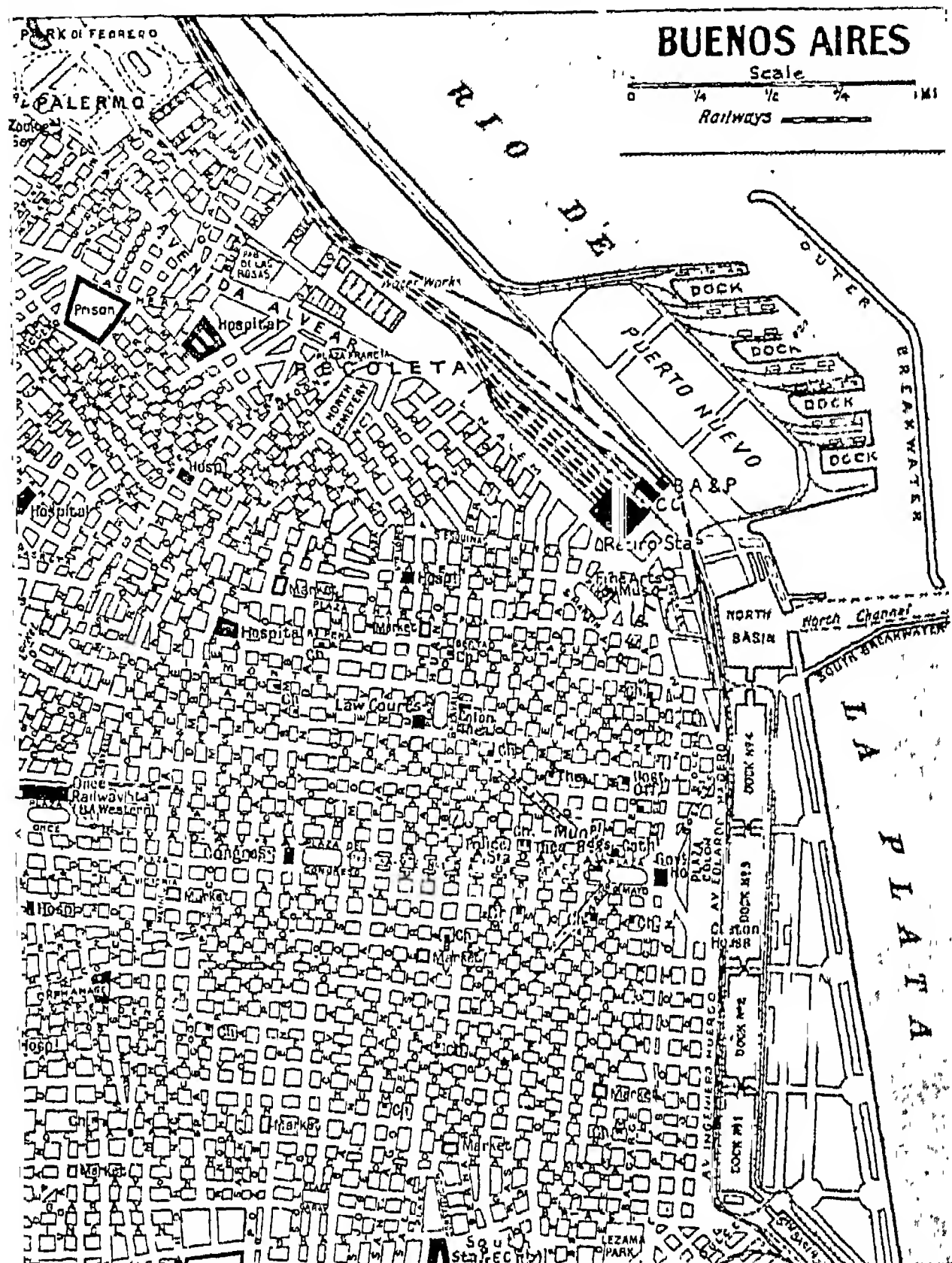
Palermo Park, the great open-air resort of Buenos Aires, cover-



1. Kavanagh Building, 30-storey block of flats. 2. The Capitol, from Plaza del Congreso. 3. Plaza Colón, with the monument to Christopher Columbus; left background, Ministry of Finance; right, Casa Rosada

(Government House). 4. Plaza de Mayo, the centre of the city. 5. Avenue Roque Sáenz Peña, one of the new diagonal avenues. 6. Avenida Presidente Roque. 7. Part of the city seen from the harbour

BUENOS AIRES : THE IMPOSING CAPITAL OF THE ARGENTINE REPUBLIC



Buenos Aires. Plan of the capital of the Argentine Republic. The city is famous for its fine avenues and boulevards

ing about 840 acres, is well laid out with zoological gardens, aquarium, motor track, boating lakes, sports grounds, and aerodrome. The race-course seats 30,000 people, and there is a large racecourse at San Isidro and one at the neighbouring seaside town of La Plata. Adjoining Palermo Park the show grounds of the Argentine Rural Society are the scene of the great May and Sept. exhibitions of livestock, agricultural produce, etc., the most important show of its kind in the world. The Parque Lezama is the most beautiful with its ancient trees, shady paths, rose gardens, and terraces. The municipal botanical gardens contain specimens of trees and plants from every province of Argentina. The open-air baths on the river front have an open-air theatre, gardens, and public music.

Tennis, football, hockey, and basketball clubs are favoured by all nationalities, cricket is played by the British, and baseball by the

Americans. Polo is popular and there are more than a dozen golf clubs. The Hurlingham Club compares with any athletic club in Europe or the U.S.A.

The national library has 200,000 volumes and 10,000 manuscripts, and there are a municipal museum, a colonial and historical museum, and a natural science Museum.

Buenos Aires is the seat of a Roman Catholic archbishop. In addition to the great cathedral, built in 1752 and modelled after the style of the Madeleine in Paris, there are many other churches, including S. John's pro-cathedral, opened by the Anglican church in 1831, eight Scottish Presbyterian churches, and the principal American church, Methodist-Episcopal. The university, with faculties of law, medicine, science, etc., has 22,000 students. La Prensa (expropriated by Perón in 1951) was the world's most influential Spanish-language newspaper. Expensive

hotels, such as the Plaza and the Alvear Palace, vie with the most sumptuous in Europe or America. First-class restaurants include Harrods (a branch of the London store). Typical Argentine restaurants include La Cabana, Un Rincon de Mendoza, and La Estancia. The leading theatre is the Colon, seating 3,750. Cinema theatres, mostly of American or European origin, are very numerous.

The British Society, with branches at Mendoza and Rosario, has 2,000 members of British nationality or descent and maintains an employment bureau. The lounge, library, and writing rooms are open to members, to whom legal advice about passports and registration is given. The education of children of British parents has special attention. The Bank of London & South America has a head office in Buenos Aires and numerous branches. The Royal Bank of Canada has a head office and two branches in Argentina.

The executive power is vested in the mayor, who is appointed by the president and assisted by a municipal council. Justice is administered by a justice for each of 20 districts.

History of the City

The city of Buenos Aires was founded Feb. 2, 1536 (N.S.), by Pedro de Mendoza, who called it Puerto de Santa Maria de los Buenos Aires. The site was for a time abandoned and then reoccupied. In 1618 it was made the capital of the province of Rio de la Plata, then under the governor of Paraguay, who in turn was subordinate to the viceroy of Peru. It was attacked by the French in 1658 and by the Dutch in 1699. In 1776 it was made the capital of the new viceroyalty of Rio de la Plata. During the Napoleonic wars a British force occupied the city by a surprise attack, but was driven out and forced to surrender. A second attack in 1807 was repulsed. In 1816 the Argentine republic threw off the Spanish yoke, and the viceroy fled to Montevideo. In 1826 Buenos Aires was chosen as the capital of the United Provinces of the Rio de la Plata. On May 4, 1853, it was declared the capital of the Argentine republic, since when its progress has been without parallel in Latin America.

Nearly 30 p.c. of the inhabitants of Argentina live the life of cosmopolitans in Buenos Aires, and among the educated classes French influence is so strong that many

have no interest in Spanish literature. Yet the Spanish spoken in Argentina is singularly virile with its own distinctively dominant tone, different from that of Mexico, Chile, or quick-talking Cuba. Consult Buenos Aires, 1536-1936, N. B. Moreno; Homage to Buenos Aires—1936, various authors; Introduction to Argentina, A. W. Weddell, 1939; Argentina, J. W. White, 1942.

Buff, CHARLOTTE (1753-1828). The heroine of Goethe's *Sorrows of Werther*. She attracted the poet's notice in 1772, when he was studying law in Wetzlar. Lotte was the daughter of the Amtmann who looked after lands belonging to the Teutonic Order, and was engaged to Kestner, the Gotha secretary of legation. To avoid complications Goethe took refuge in flight. Consult Lotte in Weimar, T. Mann. trans. H. T. L. Porter, 1940.

Buffalo (*Bubalus*). Large animal of the ox family, found chiefly in Africa and India. No examples are found in the Western hemisphere, though the name is erroneously applied to the N. American bison (*Bison americanus*). Buffaloes are distinguished by their horns, which are flattened at the base, triangular in section, set low on the skull, and have their bases close together.

The African buffalo (*B. caffer*), of which there are several races varying mainly in size, is sturdy and heavy, with short neck, large ears, and a thin coat of blackish or reddish hair. It is found in swampy districts, feeds at night or early in the morning, and seems untameable.

The Indian buffalo is a heavier animal, with straight head and usually long horns. Its ears are comparatively small, and the colour of the hair is black. It sometimes stands as high as 6 ft. at the shoulders. Found wild in the jungles of the plains, always in herds, it does great damage to crops. Domesticated breeds are found in all parts of India.

Buffalo. Single-seat mono-plane fighter aircraft, built before the Second Great War by the Brewster Aeronautical Corporation of Long Island City, U.S.A. Known originally as the F2A-1 type, it was named Buffalo when a small number were adopted by the Fleet Air Arm of the Royal

Navy in 1940. It was subsequently given the same designation by the U.S. navy. The Buffalo was fitted with an air-cooled radial engine and was armed with two fixed forward-firing machine-guns adapted to fire through the propeller arc. A machine which was obsolete in 1940 judged by British standards, it was replaced by much faster and better armed fighter types evolved in the U.S.A.

Buffalo. Second city of New York, U.S.A., the co. seat of Erie county. It is at the E. extremity of Lake Erie, and at the head of the Niagara river, 423 m. by rly. N.W. from New York. Because of superb natural advantages—notably its position on Lake Erie, which makes it one of the chief outlets for the agricultural produce of the Mid-W., and its proximity to New York—Buffalo is one of the country's leading industrial and commercial centres and one of the world's great ports.

and a marine air terminal. Two bridges connect it with Canada.

Buffalo, which claims to be the world's foremost grain distributing centre, receives, processes, and distributes 250,000,000 bushels a year. The first grain elevator was erected in 1843. Other leading products received, stored, and distributed are flour, livestock, iron, steel, coal, and lumber. There are foundries and machine shops, motor vehicle, aircraft, railroad equipment, farm implement, electrical machinery, radio, radiator, and boiler factories, blast furnaces and glass plants, shipyards, flour and lumber mills, slaughtering and meat-packing plants, and the world's largest parachute factory. Only New York surpasses Buffalo in volume and variety of products.

Prominent buildings are the new 32-storey city hall, the federal building, Buffalo university, Canisius (Jesuit) College, the cathedrals of S. Joseph and S. Paul, and a number of commercial office blocks, including the Ellicott Square building, one of the largest of its kind in the world. The 10 parks cover 2,300 acres, the finest being Delaware Park, 239 acres, with a lake. The water power of Niagara Falls generates electricity for lighting and other

purposes, and the water supply (municipal) is obtained from Lake Erie. Pop. (1950) 580,132.

Buffalo was organized as a town in 1804, and named New Amsterdam. It received its present name in 1810, when it was incorporated. During the second war with England in 1813 the place was



Buffalo. Left. Indian water-buffalo; this breed can be domesticated. Right. African buffalo, a smaller animal which is untameable
Gambier Bolton, F.Z.S., and F. W. Bond

The U.S. state, and city governments have cooperated to exploit these advantages, building inland waterways and dredging the lake harbour. The water power from Niagara Falls provided another incentive to commercial pre-eminence. Buffalo is served by 14 rly. lines. It has its own airport

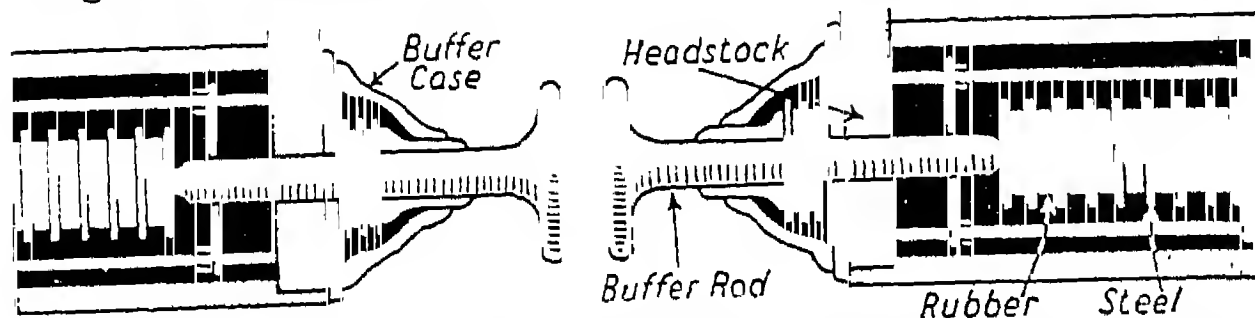


Buffalo, New York State. View of the business quarter looking towards the harbour; the broad highway on the left is Main Street

destroyed by British and Indians, who burnt the town. Owing to its undoubted advantages as a trading centre, the town was soon afterwards rebuilt. On the completion of the Erie Canal in 1825, it began to progress rapidly. It

springs are compressed, their resistance increasing with the extent of the movement.

Buffers on coaches and wagons have elliptical heads to prevent locking when the train is taking a curve. Close-coupled coaches for



Buffer. Train buffers with rings of rubber alternating with plates of steel; when the carriages come together the rubber is compressed and absorbs the shock

became a city in 1832, and 21 years later the neighbouring village of Black Rock was absorbed. Buffalo was the seat of the Pan-American Exposition in 1901. It was the home of two presidents, Fillmore and Cleveland, and the scene of McKinley's assassination, Sept. 6, 1901.

Buffalo. Massif of the Australian Alps, Victoria, on which is the Mt. Buffalo National Park, 25,000 acres. The highest peaks are the Horn, 5,645 ft., and the Hump, 5,221 ft.

Buffalo Bill. Nickname of William Frederick Cody (q.v.).

Buffer (Old Eng. *buffen*, to strike). Object interposed between two bodies to sustain the shock of their contact. To be effective a buffer must be either of an elastic nature or fitted with a shock-absorbing device. The most familiar types of buffer are those employed on railway rolling-stock and at terminal stations. The latter consist of hydraulic cylinders rigidly secured to masonry foundations at the end of a track. In each cylinder is a ram, projecting several feet and fitted with a buffer head. Water admitted to the cylinder presses the ram outwards to its full extent. The impact of a train forces the ram into the cylinder, driving the water back through passages in the latter, the resistance of the water producing a cushioning effect. The passages decrease in size from front to rear of cylinder, thus increasing the resistance.

Buffers on rolling-stock are fitted with springs to absorb the frequent shocks encountered. A typical design of Spencer Moulton's is one in which the main springs, consisting of alternate rubber blocks and metal plates, are contained in a frame rigidly secured at the back of the buffer beam. As the buffer spindle is forced back the

suburban traffic, particularly on electrified lines, are generally built without side buffers on the inner coaches. One end of the coach has a central spring-buffer working in a cylinder which presses against a central plate on the buffer frame of the adjacent coach. Automatic buffer couplings are also mounted centrally. The buffer on one end of the coach is fitted with a drawbar which passes through a large-faced buffer on the second coach and is automatically locked by a pin which is tripped by the drawbar as it enters the receiving buffer. See Railways.

Buffer State. Term applied to a small nation state geographically separating two greater and potentially rival states, thereby being of political importance to the latter in making more difficult any immediate hostilities between them. Belgium, Poland, Persia, Tibet, and Afghanistan are, or have been, examples of buffer states.

Buffon, GEORGES LOUIS LEClerc, COMTE DE (1707-88). French naturalist and philosopher. Born at Montbard, Côte d'Or, Burgundy, Sept. 7, 1707, he read law at the Jesuit College at Dijon, and then devoted himself to science. He wrote treatises on agriculture



Comte de Buffon, French naturalist

and physics, and on the death, in 1739, of Dufay, director of the King's Garden and Museum, Buffon was appointed by Louis XV to succeed him. In association with Daubenton and others he spent the rest of his life in the production of his great work on Natural History, of which 36 volumes were published between 1749-89. One of those, *Époques*

de la Nature (1778), contained Buffon's striking anticipation of the law of evolution—that an unbroken succession of life-forms could be traced through the animal kingdom. Buffon's earlier studies were in the direction of mathematics, and during a visit to England he translated Newton's treatise on Fluxions into French. He was also interested in agriculture. Buffon, who was the author of the well-known aphorism, *Le style est l'homme même* (the style is the man himself), on his admission to the French Academy delivered his famous Discourse on Style. He died in Paris, April 16, 1788. The Natural History was continued by Lacépède and others; in 1942 an edn. was published with aquatint illus. by Pablo Picasso.

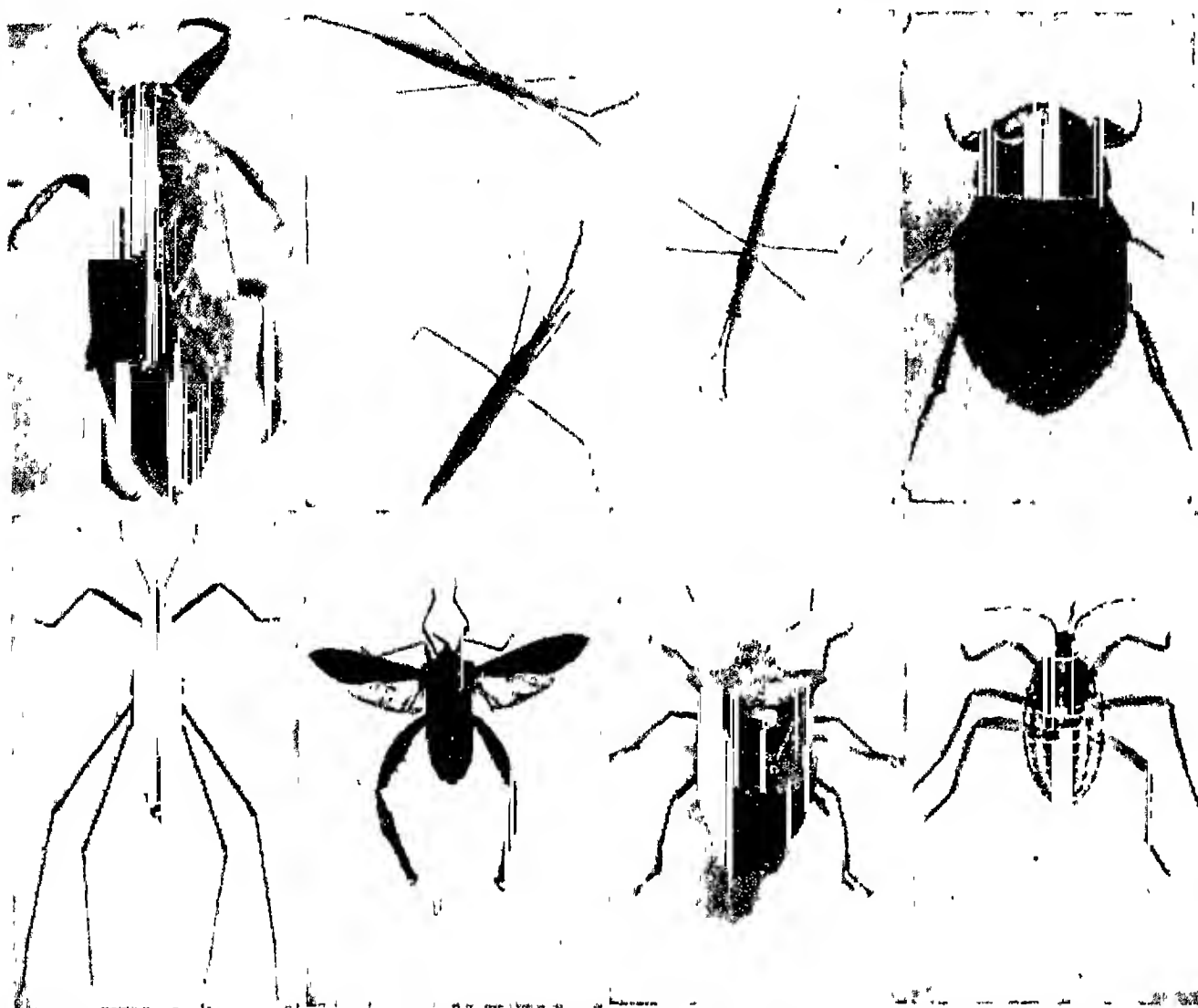
Buffoon (Ital. *buffone*). Term for a professional jester or fool, later applied to a clown or mountebank, and nowadays to one who makes himself gratuitously ridiculous. The Italian *buffone* is connected with *buffire*, to puff or blow; cf. the common comic gesture of puffing out and slapping the cheeks. See Clown.

Bufs, THE. Familiar name of the East Kent Regiment, the old 3rd Foot. See East Kent Regiment.

Bug. Popular name applied to insects comprising the sub-order Heteroptera of the natural order Hemiptera. They have four wings, the upper pair differing from the lower in the basal half, being of a thicker, more horny texture. There is no complete metamorphosis, the form being much the same in all stages, except that the adult has wings. The mouth parts are so modified as to constitute a beak, consisting of a protecting sheath and a fine tube composed of four stylets which pierce the skin of animals or plants. A pumping chamber in the head draws up blood or sap from the victim. A characteristic of almost the entire sub-order is a disgusting protective odour emanating from stink-glands, situated on the back of immature insects, but on the underside of the adult.

Most of the plant-feeding species do damage to the vegetation they attack. The mosquito-blight (*Helopeltis*) is a pest in Indian tea-gardens, impairing the quality of the leaf. The chinch-bug (*Blissus leucopterus*) is destructive to corn-crops in the U.S.A., and the cotton-stainers (*Dysdercus*) spoil cotton-bolls in many lands.

The bed-bug (*Cimex lectularius*), a wingless alien of uncertain origin



Bugs. 1. Giant water bug of South America (reduced). 2. *Ranatra linearis*, a British water bug (reduced). 3. *Naucoris cimicoides*, a water bug. 4. Waterskater. 5. Big-legged bug. 6. Shield bug. 7. *Velia currens*, water bug

(probably W. Asian), is a cosmopolitan pest in dirty homes and old houses where there are numberless crevices for daylight hiding. It has never been proved to convey the germs of any disease, but is troublesome owing to the irritation caused by its feeding habits. The tropical bed-bug (*Cimex hemiptera*) is common in India; *C. boueti* is the tropical bed-bug of Africa and S. America. There are other kinds which live on bats.

Many bugs are aquatic, and every fresh-water pond contains numerous species, of which the boatman or boat-fly (*q.v.*) (*Notonecta glauca*), the water-scorpion (*Nepa cinerea*), and the water-gnats or skaters (*Hydrometra* and *Velia*) are well-known examples. A tropical species (*Lethocerus grandis*) is 4 ins. long, and attacks small frogs and fishes. The sea-skaters (*Haliobates*) are found at the surface of the Atlantic and Pacific. See Insect.

Bug or South Bug. River of Ukraine S.S.R. The Greek Hypanis, and known as the Black Sea Bug, it rises in Volhynia, flows S.E. for some 450 m., and forms near Nikolaiev an estuary 30 m. long, opening into Dnieper Bay. It is navigable for about 55 m. In 1941 and 1944 there was severe fighting on its banks. See Russo-German Campaigns, pp. 7183, 7188.

Bug or West Bug. River of Russia and Poland. Sometimes called the Polish Bug, it rises mid-

way between Lvov and Tarnopol, and flows N., forming the Russo-Polish frontier for some 160 miles. When it reaches Brest it turns W. to join the Vistula 21 m. below Warsaw. About 440 m. long, it is navigable for half its course. An affluent and canal connect it with the Dniester.

Severe fighting took place along its banks between Russian and Austro-German forces in 1915. During the Second Great War, when Germany and Russia divided Poland in 1939, that stretch of the Bug which later lay along the Russo-Polish frontier formed part of the demarcation line. There was heavy fighting along its course in 1941 and 1944.

Buga. Town of Colombia, in Valle dept. On the Cauca, at a height of 3,600 ft., it is some 55 m. by rly. E. of Buenaventura. It trades in sugar, coffee, cattle, and rice. Pop. (est.) 50,000.

Buganda. Prov. of Uganda, bordering Victoria Nyanza. It is divided into three administrative districts, Mengo, Masaka, and Mubende. Principal towns are the commercial centre, Kampala, on the Kenya-Uganda rly., and Entebbe, seat of govt. There is communication by lake steamer with Kenya and Tanganyika. Cotton, coffee, maize, castor oil seed, ground nuts, and plantains are cultivated, and cattle are reared. Pop. (1953 est.) 1,500,000.

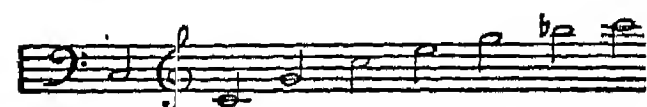
The kingdom of Buganda, whose people are the Baganda, was

already an organized community under its kabaka (ruler) Mutesa, when the first European explorers Speke and Grant reached the capital, near the present Kampala, 1862. Control of the territory by the British East Africa co. was proclaimed, 1890; it was taken over by the British govt., 1894. The status of Buganda was laid down by the Uganda agreement, 1900, subject to which the hereditary kabaka exercised direct rule over his people through his ministers and the great lukiko (an assembly with 60 elected members out of a total 89). Kabaka Mutesa II, exiled in 1953 for failing to conform fully with the terms of the 1900 agreement, was restored in 1955.

Bugbane. (*Cimicifuga elata*). Perennial herb of the family Ranunculaceae. A native of E. Europe, Siberia, and N. America, it has leaves divided into three leaflets, and the small whitish flowers are conspicuous only by their association in terminal clusters.

Bugis. People of early Malayan stock in Celebes, Indonesia. Allied in blood, in culture, and in speech to the Macassars, whose Mahomedanism, tinged with Hindu influence, they share, they are excellent weavers and dagger (kris) makers. By their skilful seamanship and aptitude for barter they control the coasting trade of their group of islands.

Bugle. A brass instrument of treble pitch used for military signals. Its open notes give the chord of B flat, thus:



written in Key C, one tone higher. Side holes, covered by keys, were added in 1810 to give the intermediate notes, but this form, known as the key-bugle or Kent-bugle, has been superseded by the more useful cornet-à-piston in military and other bands. The word is derived from *buculus*, young bullock, the instrument being originally of ox-horn.

Bugle Lily (*Watsonia*). Genus of bulbous perennials, members of the

family Iridaceae. Natives of S. Africa, they have long, stiff, sword-shaped leaves, and flag-like flowers in a tall spike, scarlet, pink, rose, or purple in colour.



Bugle lily, showing flag-like flowers

Bugloss. Popular name (through Fr. *buglosse* from Gr. *bouglossos*, ox-tongued) for certain



Bugloss, *Lycopsis arvensis*

plants with rough, bristly leaves, which are considered thus to resemble the tongues of oxen. The plant particularly known as bugloss is *Lycopsis arvensis*, an annual or biennial herb, native to Great Britain and S. Europe, which is a weed of cultivated ground and sandy heath. It is a bristly plant from 12 ins. to 18 ins. high. The leaves are lance-shaped or oblong, and the clustered flowers are bright blue. The name is applied also to *Echium vulgare* (see Viper's Bugloss). Both plants belong to the family Boraginaceae.

Bugojno. Town and district of Bosnia, Yugoslavia. A hilly country, traversed by the river Vrbas, the district is served by branch rlys. to the line from Serajevo to Bród on the Sava. Bugojno, the chief town, on the river Vrbas, is a rly. terminus. Pop. (1954) district, 58,796.

Buguruslan. A town of the R.S.F.S.R. in Chkalov region, on

the river Kinel, at its confluence with the Tarkhanka, 106 m. by rly. N.E. of Kuibishev. It is the centre of a farming district and has trade in leather, wax, and cattle. It also has flourmills. Pop. 12,000.

Bühl. Town of W. Germany, in Baden. It stands near the celebrated valley of the Bühl, where are the beautiful falls of Gerthelbach, 26 m. S.W. of Karlsruhe. Pop. (est.) 5,000.

Buhl or **BOULLE.** A style of furniture decoration introduced by André Charles Boulle, a famous cabinet-maker who flourished in Paris under Louis XIV. Its chief characteristic is the application of tortoiseshell veneering on prepared wood. The surface is inlaid with delicate tracery in metal (gilt-bronze or silver), or inlays of thin metal are adorned with tortoiseshell tracery. Real Buhl furniture was solid, curved lines usually predominating; heavy mountings in chiselled ormolu were often added.

Builder, THE. Published in London, this is the leading and oldest British weekly newspaper devoted to the architectural profession and building industry. Its contributions, written by specialists, cover all branches of the industry, at home and abroad. It was founded Dec. 31, 1842, by Joseph A. Hansom (*q.v.*), architect and inventor of the hansom cab. Its offices are at 4, Catherine Street, London, W.C.2.

BUILDING: ITS PLACE IN CIVILIZATION

M. S. Briggs, F.R.I.B.A.

Here is given the story from the earliest times of many activities in building. See also Architecture; Bricks and Brickmaking; Concrete; Floor; House; Paving; Plumbing; Roof; Tiles, etc.

The word building is from Old English *byldan*, to build, itself from *bold*, a dwelling; hence, originally, to construct a dwelling; then, gradually, to construct any type of building. The meaning of this familiar word is generally understood, but it needs to be differentiated from architecture on the one hand, and from civil or structural engineering on the other. Whereas all architecture is building, all building is not qualified to rank as architecture. Structures may be either building or engineering, or a combination of the two. All habitable, and most roofed, structures erected for human use, e.g. churches, factories, schools, town-halls, are regarded as buildings, and so are some other structures, e.g. triumphal arches; but bridges and aqueducts, which are certainly structures, are classified as civil engineering. The designing

of large contemporary buildings with a structural framework of steel or reinforced concrete entails sound knowledge of structural engineering (*i.e.* applied mathematics), but they are commonly defined as buildings. The respective functions of builder and architect have varied greatly through the ages, and are briefly indicated in this article (but see also *Architect*).

The earliest forms of dwelling can barely be called houses, being primitive huts of various types. They were erected at widely different periods according to the stage of civilization attained in each region, some regions (*e.g.* Mesopotamia and Egypt) being thousands of years ahead of others (*e.g.* most of Europe and America). Up to the 20th century, cave-dwellings were still inhabited in several highly civilized countries of Western Europe (*e.g.* Northern France), but

neither cave-dwellings nor caravans can be called buildings.

The most rudimentary type of hut, square or circular on plan, consisted of interlaced branches or wattles, with vertical sides stiffened with timber posts, and often with a central post to support the sloping thatched roof. Sometimes this form of hut was partially sunk below ground-level. Another type had walls of mud; and, in the three great riverine civilizations of Egypt, Mesopotamia, and the Indus valley, this type of walling was superseded by mud bricks baked in the sun. Such huts still form the normal housing for a large proportion of the peasants in the Nile valley, and have flat roofs of palm-branches or trunks, covered with a layer of mud. A third type of hut, found in Britain and many other countries, had walls formed of rough, undressed stones, the joints between them filled with moss or mud. It might be rectangular, circular, or oval on plan. None of these various types of dwelling involved the use of much skill or of proper tools, so they hardly merit the name of buildings.

Origins of Building

At different dates—more than 5,000 years ago in the riverine civilizations of the East, 2,000 to 2,500 years ago in Western Europe—the skilled craft or industry of building began; but its surviving products consist mainly of royal, religious, or sepulchral structures because the dwellings of humble people were fashioned of such flimsy materials that most of them have perished.

A great deal is known about building methods in Ancient Egypt, where the principal buildings were pyramids and temples of stone, often of granite, and were richly carved and painted (see *Architecture*). The names have been preserved of some of their architects, who were employed either by the kings or by the hierarchy of priests. Labour was conscripted on a vast scale, and was often brutally treated, crowds of men being driven by the lash of an overseer, as may be seen depicted in contemporary carvings and paintings. Yet Sir Flinders Petrie, a great authority, discounts popular ideas on this subject, arguing that the cruelty involved has been much exaggerated, and that the labourers would have been unemployed and starving otherwise. He also notes that 113,433 prisoners of war were employed by one king on temple-building. Enormous blocks of limestone for the pyramids, and

huge granite obelisks, were transported down the Nile by barges from the quarries for use a thousand miles away. The mechanical problems entailed in these operations, as at Stonehenge in ancient Britain, have long been studied by archaeologists.

Egyptian masonry reached a high standard of finish, with smooth surfaces and very close joints. Bronze tools were used, emery being inserted in saw-blades. Limestone was easily obtained from hills close to the Nile, but granite had to be split from its bed by means of rows of wooden wedges that were wetted and then allowed to swell after being fixed in position. A mixture of lime and plaster of Paris was used as mortar for masonry, but burnt bricks were often set in bitumen (as in Mesopotamia). Good building timber was unobtainable locally, date-palms being the only trees available. The blocks of stone were secured with pins or dowels of bronze or sycamore wood.

Many of these methods were also used in Mesopotamia, where brick—burnt or unburnt—was the staple building material. Glazed and coloured terra-cotta was often used for facing the more important temples and palaces. This craft was eventually adopted by the Arabs after they conquered Mesopotamia in the 7th century A.D., and became a characteristic feature of Muslim architecture throughout the Muslim empire stretching from India to Morocco and Spain (see Alhambra).

Early Greek Methods

In Greek buildings of the earliest or Mycenaean period, polygonal or "cyclopean" masonry was often used; but in the Golden Age of Greek architecture (5th century B.C.), stone was often replaced by marble for the temples and other important buildings. The masonry of that period has never been surpassed for accuracy and delicacy of workmanship. Pentelican marble, from a quarry near Athens, was the favourite material for monumental buildings in that city. The blocks of stone or marble were secured with dowels of cypress wood or with iron or bronze fastenings. Ingenious mechanical devices were used to lift the huge stones. One amazing fact recently discovered is that iron girders were used as cantilevers or beams in the Propylaea at Athens, the Parthenon, and other buildings of the 5th century B.C. Timber was avail-

able for the carpentry of roofs, and burnt clay tiles for covering them, but marble tiles were occasionally used.

These elaborate and highly finished stone buildings, with their marble columns and bases, had developed over a period of centuries from timber prototypes with wooden posts and beams. Arches were seldom used, though the Greeks understood the principle of the arch. All through this period, most dwelling-houses in Greece, outside the principal towns, were mere huts, and few have survived. The names of many Greek architects have been recorded; but not much is known of the organization of the building industry.

The Manual of Vitruvius

Of Roman building methods and organization, on the other hand, a great deal is known, thanks partly to a manual of architecture and building construction written by Vitruvius Pollio some time between 27 B.C. and A.D. 14. He was an architect in the public service under the emperor Augustus, that ruler of whom it was said that he "found Rome a city of brick and left it a city of marble"; and, indeed, although Rome was reputedly founded in 753 B.C., it was not, in fact, until the time of Vitruvius that it began to be rebuilt on the grand scale. He describes the respective duties of architects, engineers, and surveyors; Roman building by-laws and municipal building-inspectors; the water-supply system and its administration; he mentions competitive tenders from contractors, specifications, building contracts, and penalties. Above all, he describes in great detail all the materials then in use, and the processes of construction, from seasoning bricks and timber to driving piles and curing damp walls.

Although many features of Roman building, more especially the use of columns and beams (trabeated construction), were derived from the Greeks, together with elaborate rules for design, the Romans introduced arches and vaults as their main structural elements, and for these favoured burnt brick and concrete. Their concrete was a novelty, and enabled them to build their marvellous domes, aqueducts, basilicas, and other great structures. Its excellence was due in the main to the fine volcanic powder called pozzolana, which proved to be an admirable material for mixing

with slaked lime to form mortar or concrete. Mud bricks were generally used up to the time of Augustus: thereafter kiln-burnt bricks became popular. Brick arches were much used in combination with concrete, as in the Pantheon.

Roman bricks were larger and thinner than those of today, but in important buildings were normally covered with stucco or marble. Many examples of Roman provincial brickwork can be seen in England: *e.g.* at Verulamium near St. Albans, at Colchester, and in the Roman Wall of London, where the bricks are laid in double courses at intervals, the remainder of the wall being of concrete filled in between facings of rubble stone.

There are also many examples of Roman dressed masonry in the former provinces, including England, the finest being the huge aqueducts near Nîmes in France (the Pont du Gard) and at Segovia in Spain; triumphal arches as far afield as Timgad in Africa and Palmyra in Syria; theatres at Arles and Nîmes in France; and, of course, a much greater number of buildings in Italy itself.

Timber was used as shuttering for concrete; for roof trusses (sometimes cased in bronze); for lintels over doors and windows of small houses as well as for doors themselves; but timber did not play a prominent part in the larger buildings. Hardly any examples of Roman carpentry have survived, but it is clear from Vitruvius's book that some types of joint still in use were used by the Romans, as they were indeed by the Greeks and Egyptians.

Roman Comfort

In their multi-storeyed flats in Rome itself, as in their country "villas" in Britain and other provinces, there were many comforts. Apparatus for central-heating and for hot baths can still be seen in many villas in England as well as fine mosaic floors. There was a magnificent system of water-supply in Rome, fed by arched stone aqueducts from springs as much as 60 miles away, and distributed through the city by an elaborate arrangement of lead pipes with bronze stop-cocks. Glass was in general use for windows in the time of Vitruvius, usually thick and sometimes in fairly large sheets.

After the fall of Rome in the 5th century A.D., there was an

abrupt break in this advanced civilization. For a century or two it survived in the eastern provinces, where the new capital Constantinople (Istanbul) continued to maintain the tradition, including a splendid system of water-supply, until it fell to the Turks in 1453; but the bulk of the Roman Empire lapsed into barbarism during the centuries that are known as the Dark Ages. In Western Europe, including Britain, very little building was done between c. A.D. 450 and c. A.D. 1000, when the Middle Ages begin—a period that lasted till the beginning of the Renaissance which, so far as architecture is concerned, began in Italy early in the 15th century, and in England and France about a century later.

Medieval Building

Medieval building, *i.e.* from c. 1000 up to the Renaissance, may be conveniently treated here as a whole. (For its successive phases, see Architecture.) Throughout this period, the predominant power in building operations was the Church (*i.e.* in Western Europe the Roman Catholic Church) up to the time of the Protestant Reformation in the 16th century. Many fine castles were erected, and a few stone houses for richer people, but most folk lived in flimsy cottages or huts not much better than the primitive dwellings of earlier times. The majority of the chief building enterprises were therefore initiated, financed, and controlled by powerful bishops or by the abbots and priors of the innumerable monasteries.

Lay-architects designed these buildings, which were built by lay-craftsmen who came to be organized in craft-guilds, many of which survive in London as the City Livery Companies. Although the enormous quantity and the high quality of their work remains a marvel, and forms an impressive testimonial to the enthusiastic piety of the age, the actual conditions of work were far from idyllic. Workmen were fined for being late or drunk, for idling, for bad language, for losing their tools, for boycotting or obstructing “foreigners” from another town acting as “blacklegs,” for quarrelling with men of other crafts over questions of demarcation of duties. Hours of work were inordinately long—from sunrise to sunset, with intervals for meals; but there were a great number of saints’ days or holy days when little or no work was done. In

frosty or wet weather, building was impossible and the workmen were stood off.

The designer, who was usually styled the master or master-mason, prepared his plans in advance on parchment, using drawing-instruments and ink. Details of moulding, tracery, etc., were drawn on large boards in the tracing-house or lodge attached to the building in course of construction (hence the origin of the lodge in freemasonry). Sometimes the architect was at work on several buildings simultaneously, travelling from one to another. With him were associated various officials concerned with administration and finance. Geoffrey Chaucer was a clerk-of-works in the royal service; and William of Wykeham, before he became a great and rich ecclesiastic, served in a similar capacity at Windsor Castle during 1356–61.

The master-builder or general contractor did not exist, each of the various crafts or “trades” working under its own master. According to circumstances, each master estimated for (a) labour and plant only, materials being provided by the building owners or (b) labour and transport; or (c) labour, transport, and materials. Sometimes the mason-contractor was also a quarry-owner. Labour was often conscripted for royal building operations. The number of men employed was sometimes enormous: *e.g.* 1,630 men at Beaumaris Castle, Anglesey.

Methods of Transport

Transport was a serious factor in medieval building operations, and might amount to as much as three times the cost of the materials carried. This was chiefly due to the lack of roads, so that, unless water-transport was available, all materials had to be borne on pack-horses—a practice which created great difficulties where large quantities of stone had to be brought long distances. In London and East Anglia, hardly any good building stone is obtainable locally, so most of the stone required was floated from distant quarries by sea or river. By this means the stone for Eton College was brought from Yorkshire and much of the stone for Westminster Abbey came from Caen in Normandy.

After a long break of nearly a thousand years following the Roman evacuation of Britain, the crafts of brick-making and brick-laying were revived. Tiles were in use from the 13th century on-

wards, while lead was a favourite material for roofing churches and castles all through the Middle Ages; but thatch and shingles provided the normal covering for dwelling-houses. The use of glass in church-windows had become general by the middle of the 12th century, but was still rare in castles and almost unknown in lesser dwelling-houses. Even in the chapter-house at Westminster, oiled canvas was used. Sanitation in ordinary houses was non-existent, but castles were furnished with *garderobes* (latrines), and in the monasteries the latrines (*necessaria*) were flushed by running water.

Although the Renaissance caused a great upheaval in architecture in Italy in the 15th century, and in England and France about a century later, it did not materially affect the medieval organization of the building industry or its methods. But a much higher standard of comfort came to be expected. Wood-panelled walls, plastered ceilings, and glazed windows all led to rapid developments in the building crafts.

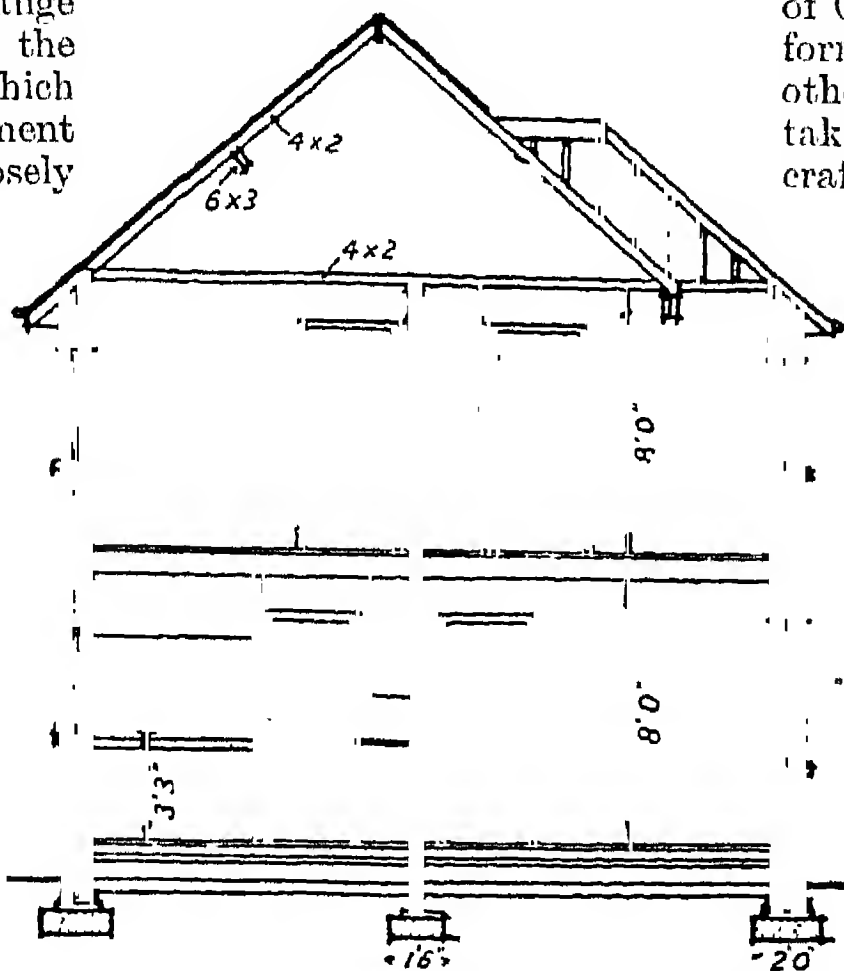
London Building By-laws

Towards the end of the 17th century, in the time of Wren, substantial changes took place. One was the publication of more stringent building by-laws for the City of London, following the Great Fire of 1666. Another was the appearance of the speculative builder, *i.e.* a person who builds houses or shops at his own expense, as a speculation, in the hope of selling them at a profit to other people. Sometimes a speculator will buy large plots, and then dispose of them, sub-divided into small plots, to smaller builders. The most notable pioneer in this field was a medical man, Dr. Nicholas Barbon, M.P. (d. 1698); and many of his houses still survive. It might be thought that Sir Christopher Wren, who suddenly turned from science to architecture at 30 years of age, would have brought about a fundamental change in building methods by introducing scientific theory into crafts which worked on traditional lines, but things seem to have proceeded much as before.

Country builders often dispensed with architects by making use of convenient little books of designs (*e.g.* *A Sure Guide for Builders*, 1729, and *The Builder's Jewel*, 1757, both produced by Batty Langley, a landscape-gardener turned architect, “for the use of

workmen"); but no great change occurred in methods until the boom in canal construction which began *c.* 1760 and the development of structural cast-iron which closely followed it. The cheap transport provided by canals led to a general use of many materials, *e.g.* Welsh slates, hitherto prohibitively expensive because of the cost of carriage. The introduction of cast-iron as a structural material profoundly affected the whole building industry, which even two centuries later has hardly adjusted its ancient traditional methods to the revolutionary change thus created.

During the half-century before Queen Victoria's accession in 1837, the civil engineer, the mechanical engineer, and the quantity-surveyor all made their ap-



Building. Section of the 20th-century architect-designed brick-built detached house illustrated below. The ground-floor room on left is the kitchen

of Carpenters and Joiners in 1800 forming a landmark. Various other craft unions followed, to take the place of the medieval craft-guilds; but their amalgamation, resulting in great industrial and political power, did not take place until the 20th century.

Nineteenth-Century Changes

During Queen Victoria's long reign, the principal changes that occurred in building practice in England, as in Continental Europe and the U.S.A., were due mainly to the increasing use of iron (and later of steel) in construction; and to the increasing use of machinery for manufacturing building materials; but there were also organizational changes due to the development of trade unions and to the corresponding development of employers' organizations. Many of the largest building firms originated as very small concerns, founded by men who had started humbly as working craftsmen but had been gifted with business acumen enabling them to undertake contracts of gradually increasing magnitude, until their firms became large limited liability companies. The old close personal touch between master and men with a very similar background inevitably disappeared with the advent of financiers whose primary obligation was to their shareholders.

The advent of building companies with capital to develop powered equipment for handling materials led to the introduction



Building. The house in course of construction, showing roof timbers; right, approaching completion, after the cement render has been applied

Architect, E. H. Gandy, A.R.I.B.A.

pearance in organized professional groups; and the invention of railways produced the engineering contractor, who undertook contracts on a large scale. One result was that the separate building crafts or "trades" tended to be merged under a single employer—the general contractor or master builder, though there are still some districts where the crafts work separately.

About 1811, Portland cement was invented by a Leeds stonemason, Joseph Aspdin, who patented it in 1824. Apart from its excellence as a component of mortar, it was soon found to be an excellent matrix for concrete, the use of which had almost

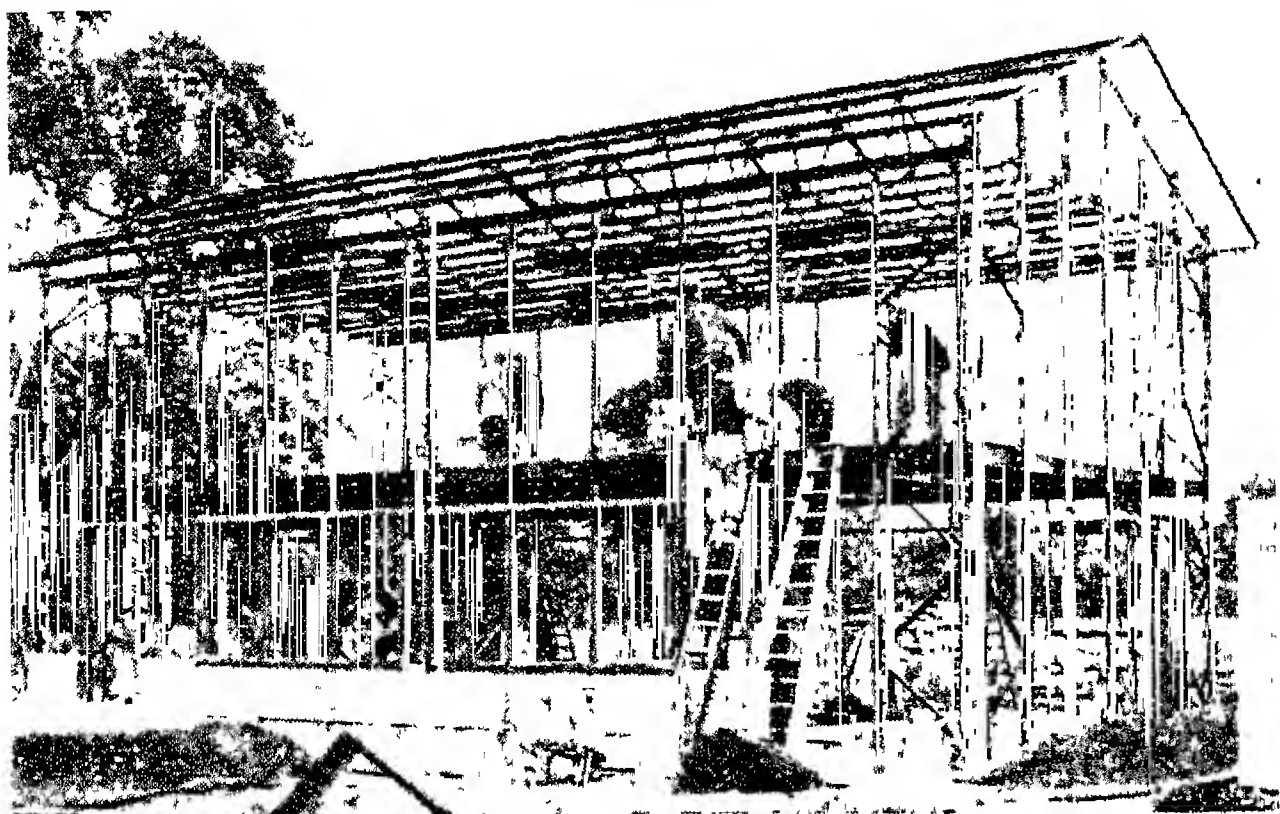
lapsed since Roman times. In 1836 the R.I.B.A. published a prize essay by George Godwin on The Nature and Properties of Concrete, and concrete soon came to be used as foundation material under walls and piers. It was many years later that its structural possibilities were fully realized.

The beginnings of trade unionism in the building industry may also be placed in this period, the formation of the Friendly Society



of larger and heavier components, so that large structures could be built more quickly and at less cost.

Cast-iron girders had been in use for many years before 1833, when a floor of cast-iron joists and concrete was produced; and



Building. Steel frame of the "Northolt" concrete clad house, ready for the precast panel cladding; only a small amount of mortar is used for the cladding, the remainder of the construction being dry

Photo, Ministry of Works

in 1850 the rolled-iron-joist was introduced into England from Belgium. In the following year the enormous iron and glass structure later called the Crystal Palace was built for the Great Exhibition in Hyde Park, and afterwards re-erected at Sydenham.

Steel-and-Concrete

From that date onwards, the process continued. Soon the greater part of the internal structure of factories and other commercial buildings came to be constructed of iron, and later of steel, though most of the external walls and party-walls continued to be of brick or stone. During the 1880s the first multi-storey buildings ("skyscrapers") with an iron framework were erected in Chicago, U.S.A. (It was some 20 years before the city of New York, to whose limited building land the skyscraper proved so peculiarly suitable, took to this style of construction and made it its own.) Later, it was found necessary to encase girders and stanchions with concrete to obviate the risk of collapse in case of fire.

The increased use of machinery led to the mechanical duplication of many ornamental features that had hitherto been laboriously carved by hand. Sanitation, water-supply, heating, and ventilation were greatly improved during the Victorian era, and in the larger towns electric light had begun to supersede gas before the end of the 19th century. Municipal housing had hardly got into its stride: and, except for town-halls and schools, nearly all building was carried out by commercial or private enterprise.

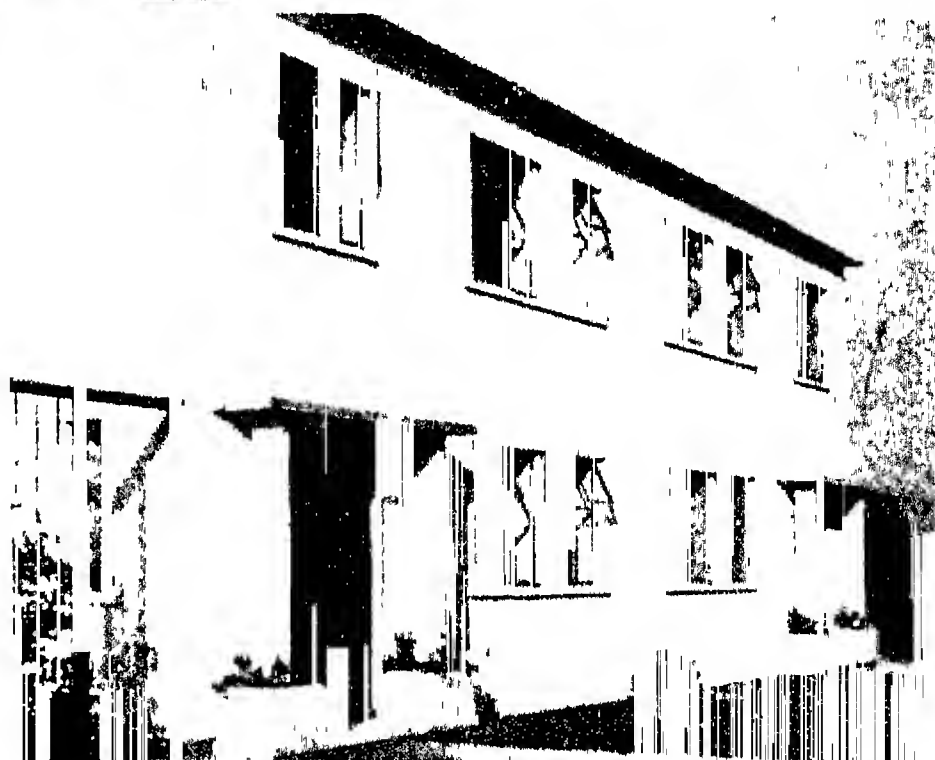
Unquestionably, the introduction of reinforced concrete into building construction at the beginning of the 20th century was a major event. The first important structures in this new material were bridges erected in Continental Europe in 1890, and for a time the initiative in design was held by France. Various systems, devised and patented by French engineers (e.g. Coignet, Consid'ere, and especially Hennebique) were exported to England and were operated by approved building contractors working under licence. Entirely new formulas were worked out so that calculations of strength could be made by English engineers and architects.

Twentieth-Century Practice

The introduction of steel framing, and then of reinforced concrete, entailed drastic modification of building by-laws, which had hitherto been based on the assumption that solid walls would carry all the weight of a building; but the necessary changes took place very slowly. In the second half of the 20th century it is permissible in the U.K. to dispense entirely with load-bearing walls, and to substitute for them a thin sheet of glass or any other material capable of excluding rain and cold, the whole weight of the structure being borne by slender columns and piers, often

standing inside the building, and carrying fireproof girders and thin concrete floors.

For nearly all industrial, commercial, and public buildings, to some extent also for houses, pitched (i.e. sloping) roofs began to be replaced by flat roofs of reinforced concrete covered with asphalt or some other waterproof material. In the great housing boom that followed the First Great War so much rural land round the larger towns was occupied by huge municipal estates of small semi-detached houses that in later years, especially after the Second Great War, a movement for increasing the density of population by con-



Building. The completed concrete clad structure, neat and practical in character: it can be erected in eight days

Photo, Ministry of Works

centrating it in flats or terraces came into being. But Great Britain has always been slow to follow the Continental habit of living in flats, the desire for a patch of private garden persisting among many people.

Synthetic Materials

Acute shortage of labour and materials during and after the First Great War stimulated the invention of many new synthetic materials as substitutes for brick, stone, tiles, and timber; also for plaster as a covering for walls and ceilings, because normal plastering entails the use of much water which has to be allowed to dry out before the later coats can be applied and before distempering can be done, thus involving a great delay in building operations. Work on building sites was further reduced by manufacturing in advance ("prefabrication") all possible components of buildings, which then needed only to be assembled.

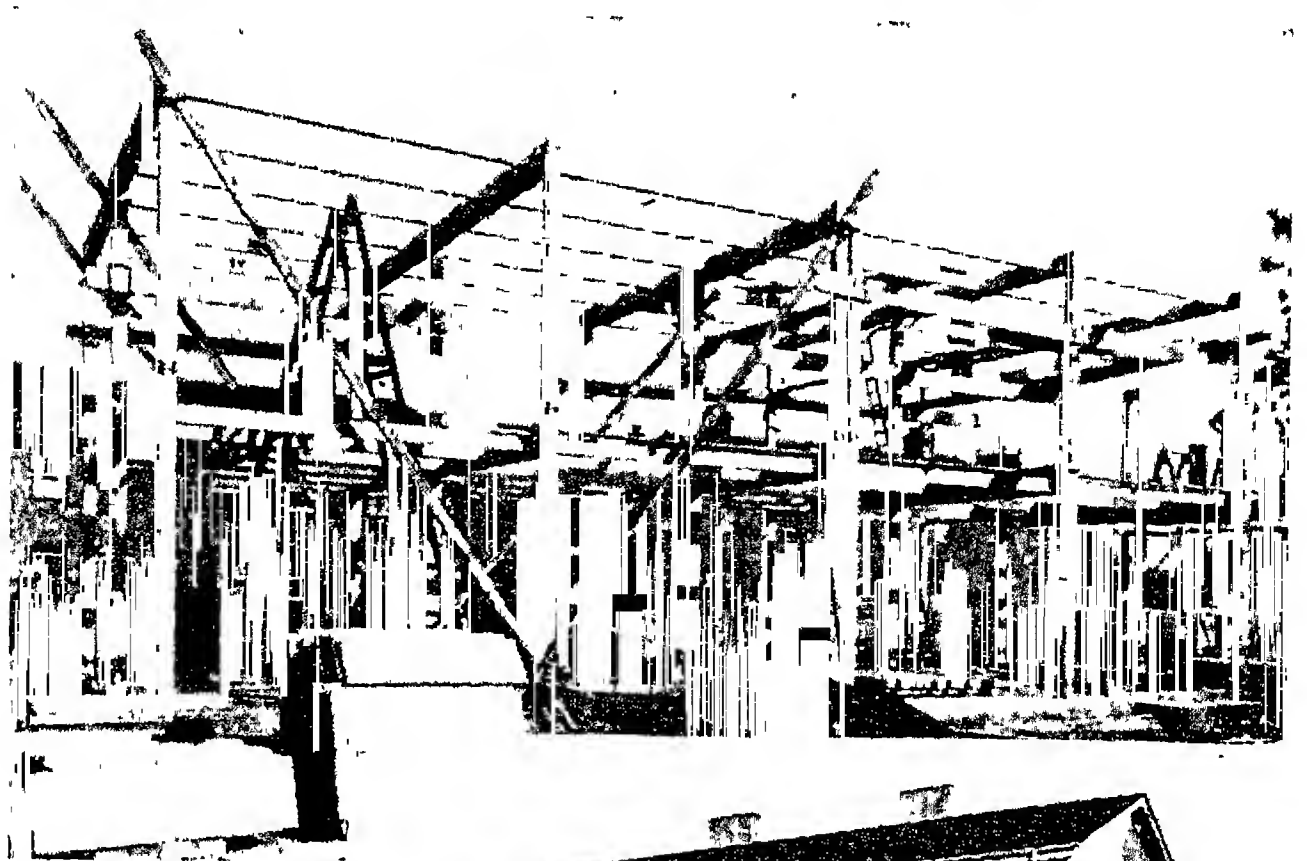
To do this, by mass-production methods, it became necessary to formulate a range of standard

types wide enough to give an architect an extensive choice in making his designs. Doors, windows, and other joinery were also standardised, and were imported in large quantities from Scandinavia and elsewhere.

After the Second Great War, the standardised and prefabricated plumbing-unit became popular for housing-schemes. It comprised a heating apparatus, sanitary fittings, a cooking unit, and all necessary pipes and connexions. Power-driven tools were introduced, e.g. for planing floors and spraying paint.

The cumulative effect on the building industry of all these innovations was tremendous. The number of skilled craftsmen on any given site was reduced, whereas the number of men required for assembling prefabricated components or for semi-skilled work in reinforced concrete, etc., was increased. The greater part of any large building was either prefabricated or was undertaken by specialist sub-contractors, so that the master-builder's task became chiefly a matter of correlating their various activities and undertaking the limited residue of work left for his own employees. Everything became less traditional and more scientific, approaching more nearly to engineering. Consult *A Short History of the Building Crafts*, M. S. Briggs, 1925; *Building To-day*, M. S. Briggs, rev. ed., 1948; *Building in England down to 1540*, L. F. Salzman, 1952; *The Building Encyclopaedia*, Waverley Book Co., new ed., 1953.

Building Laws. In English law, the term applied to the code of laws governing the erection, alteration, and demolition of buildings. The ministry of Health was the central body responsible for the administration of the

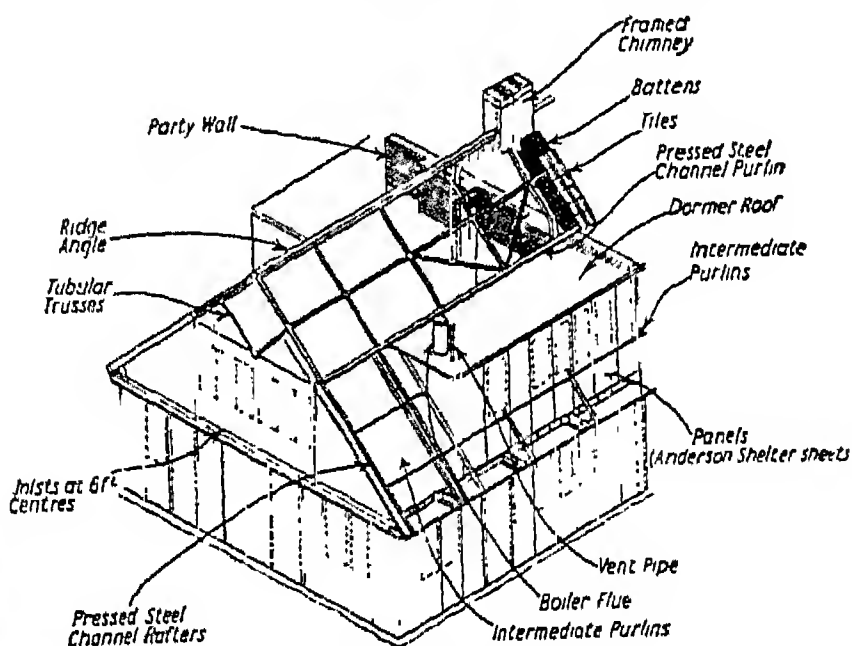


building laws until a separate ministry of Housing and Local Government was set up in 1951. Local authorities may, and if required by the minister of Housing and Local Government shall, make by-laws for regulating the construction of buildings and the materials



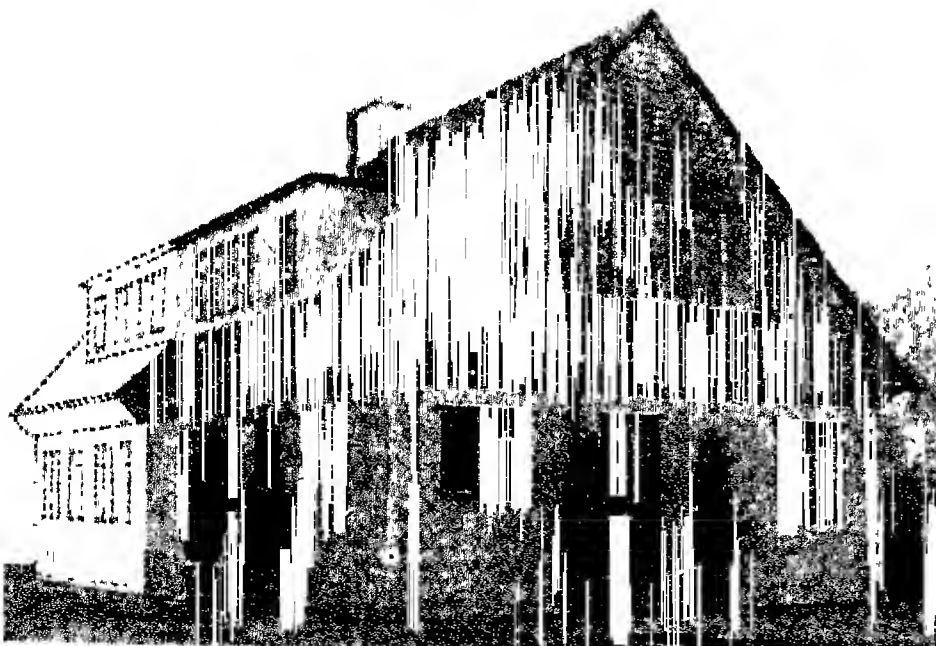
Building. Top, completed frame of a brick and steel clad house, with chimney stacks ready to be carried up to the roof level. Below, finished house

Photos, Ministry of Works



usually require plans to be deposited with the local authority for approval and provide for the inspection of the work by an inspector of the local authority after it has been completed.

For any building work that amounts to development within the meaning of the Town and Country Planning Acts, permission must be obtained, and the requirements of these acts complied with, unless



Building. Top, isometric plan of the Nuttall house, showing light steel framework, party wall, and steel panels. Below, completed unit of the house; dotted lines indicate the other half of the residence which will be added later

to be used; the space round buildings; lighting and ventilation; the dimensions of rooms intended for human habitation; height of buildings and chimneys; sanitary conveniences; drainage; tanks for water supply; stoves and fittings, so far as by-laws are required for health and prevention of fire. The by-laws

the development comes within one of the many exceptions created by order of the minister. Application for permission is made to the local planning authority, which is the relevant local county, county borough, or borough council.

In most districts buildings must conform with the building line; i.e., no building may be erected so as to project beyond the front main wall of the building on either side. Thus the Hampstead garden suburb could not be erected without a special Act of Parliament, because the picturesque irregularity of its building lines, which is one of its special features, was not permissible under any set of local by-laws.

Building Society. A society having for its object the raising of a fund by subscriptions from its members to make advances on mortgages to enable members to build or purchase houses. Subject to legal safeguards, the fund may be augmented by receipt of deposits from the public. In the U.K. such societies are governed by the Building Societies Acts from 1874 onwards. Nearly all existing societies are incorporated, and every new association must frame a complete set of rules for its management, and obtain from the Registrar of Friendly Societies a certificate of incorporation. Annual returns must be made to the registrar, who maintains supervision over all societies, and ensures efficient annual audit of their accounts.

The liability of investing members who hold shares in respect of which no advance has been made is restricted to the amount paid or in arrear. Borrowing members, to whom advances have been made, are liable for the amount payable under the mortgage or under the rules. Building societies may be either "permanent" or "terminating" (for a limited period of existence). In both kinds the principle is the same. The society receives money from the members, by issue of shares. It may also receive deposits at interest from members and others. The capital thus acquired is lent to individual members who wish to buy real property, the society holding as security a mortgage on the property.

Repayment of Loans

Repayment by a borrowing member is usually effected by fixed weekly or monthly amounts, calculated to pay off both principal and interest over a specified term of years. When the debt is repaid, the mortgage is vacated, and the borrower then receives the deeds of the property.

The society may take into account in making the advance certain forms of additional security—e.g. a charge on a life policy; a guarantee by a local authority; a charge given by the member on money deposited with the society or on trustee investments; a guarantee given under a continuing arrangement. A continuing arrangement arises when an arrangement is made between the society and another person—usually the company developing a building estate—under which, it being contemplated that several advances will be made by the society to

different persons who buy houses on the estate, guarantees are given by the company to the society for any money advanced beyond what would normally be advanced on the security of the houses alone. Wherever the society takes additional security from anyone other than the member, the society must, before the contract for the advance is made, notify the member of the amount the society would have advanced on the security of the house and land alone.

Without this information as to the additional security the purchaser of the house would think that the advance was being made to him on the security of the house or land alone and might for that reason form an erroneous view as to its value. If the notice is not given, no sums are recoverable in respect of the advance or the security.

Where a society makes an advance to defray the purchase price of a house or land, it warrants that the price is reasonable unless it notifies the member in writing that no such warranty is implied.

Origin and Development

Originating in the latter half of the 18th century as a working-class movement for the provision of houses by mutual aid, building societies gradually increased in popularity, and shared in the general development of co-operative institutions in the 19th century. The introduction of the "permanent" type c. 1846 provided a useful non-fluctuating investment for people of modest means, and though confidence was shaken by the failure of the Liberator society in 1892, the Building Societies Act of 1894 rendered a repetition of such a disaster almost impossible by imposing much stricter government supervision. The period following the First Great War witnessed an enormous expansion in the activities of building societies.

BUILDING SOCIETIES ACT, 1939. To regulate new methods and protect purchasers of houses on mortgage the Building Societies Act of 1939, which came into effect in 1940, was passed. This had three main objects:

1. *Regulation of the system of taking additional security.* Building societies do not usually lend more than $\frac{2}{3}$ or $\frac{3}{4}$ of the purchase price of the house if the only security for the loan is the house itself. Many borrowers find it diffi-

cult to raise the remaining $\frac{1}{3}$ or $\frac{1}{4}$ in cash, and accordingly a system has grown up whereby the society can make a higher advance (not exceeding the value of the property), where some security additional to the house, such as a deposit by a third party, is made available.

For some years, many building societies had been working in close cooperation with companies developing building estates, so that frequently the advances to most of the purchasers on one building estate would be made by one building society. This made possible the form of additional security called a "continuing arrangement." Under this, guarantees for the amount advanced to the borrower in excess of what would normally be lent on the security of the house alone were given by directors of the building estate company; and these guarantees were fortified by the creation of a fund—the builders' "pool"—into which the building estate company paid, until the fund reached a certain sum, an agreed amount, in respect of the houses built by it which were bought by purchasers with the assistance of a mortgage from the building society. This fund was always available to meet any deficiency should any of the borrowers default.

Additional Securities

This system of additional security might enable people to borrow up to 95 p.c. of the purchase price, but the act prohibited the taking of any additional security except when the advance was to a member of the building society.

The specified additional securities included (1) a charge on a life assurance policy up to the surrender value; (2) a guarantee by an insurance company or by a local authority; (3) a guarantee under a continuing arrangement which was supported by deposits of money.

2. *Period of Repayment.* Except where there was a continuing arrangement, there was no restriction on the period of repayment. When there was such an arrangement, the period could not exceed 20 years unless the advance was made under a "special" continuing arrangement. The period of repayment could be extended to avoid hardship to the borrower at any time a year or more after the advance was made.

3. *Protection of Prospective Borrowers.* Before 1939 borrowers were not usually told of the additional security taken by

the society, as it was thought they would become less willing to pay if they knew someone else was also liable. They sometimes assumed, not unnaturally, that the total advance made to them was made on the security of the house they were buying; and further assumed that if the building society was prepared to advance 95 p.c. of the purchase price on the security of the house, the house must be worth what was being paid for it. By the 1939 Act, whenever a society makes an advance on additional security, the society must inform the member before he signs the contract how much it would lend on the house alone and what additional security it is taking from other persons. If the borrower is not informed, none of the money advanced can be recovered by the society or by any other person without leave of the court. Likewise when a person is about to buy land, he must be notified if anyone having a financial interest in the sale of the land has an arrangement with the building society under which additional security is to be provided. If he is not notified he may rescind the contract.

A building society, by advancing money to a member to defray the purchase price of a house, is deemed to warrant that the price is reasonable unless it notifies him in writing that no such warranty is to be implied.

Penalties for Misrepresentation

It is a criminal offence (penalty fine of £100 or 3 months' imprisonment or both) for anyone having a financial interest in the sale of any land or in the erection of a building on it to represent, without having reasonable grounds for believing the representation to be true, that the making of an advance by a building society on the security of the land implies that the land is a sufficient security for the advance. When a borrower defaults and the building society sells the land under its mortgage, it must take reasonable care to ensure that the best price reasonably possible is obtained.

It is illegal for anyone having a financial interest in the sale of any land to receive any commission from a building society for introducing the mortgage business to it. Both the person paying the commission and the person receiving it are liable to a fine of £500 or 3 months' imprisonment or both.

Building Stones. The suitability of a stone for building depends mainly on its strength and its power to resist the destructive action of rain, frost, and certain atmospheric gases. Limestones, sandstones, and granites are the chief natural building stones.

Suitable limestones for building are quarried in many parts of the British Isles. Portland stone from Dorset is very largely used, especially in London. Ancaster stone from Lincolnshire, Bath stone from Wiltshire and Somersetshire, and Hopton Wood stone from Derbyshire are also extensively employed. Crystalline limestones which take a polish are called marbles, and are used mainly for interior and decorative work. The Italian and Connemara marbles are familiar examples. Limestones are affected by carbon dioxide and sulphur in the atmosphere, but they weather slowly and evenly.

The strongest sandstones are those in which the constituent grains are cemented together by silica. Others weather badly. Much good sandstone comes from Yorkshire and Lancashire.

Granites are composed of various minerals intercrystallised. Their colour, variety, and ability to take a polish enable them to be used decoratively as well as for heavy outdoor work. Artificial stones are largely used in place of the natural material. The cheapest, used where appearance is not an important quality, are in effect blocks of concrete, with or without a facing of finer texture on the sides that are visible in the building. Reconstructed stone uses as the aggregate crushed stone of a suitable variety, which is cemented together by Portland cement. Small blocks are cast solid, but larger ones may be hollow. Steel reinforcement may be incorporated. Aberdeenshire, Kirkcudbrightshire, and Cornwall are the chief British sources of granite, and much has been imported from Norway.

Artificial stones, made by cementing together powdered rock fragments, are of fine even texture and of great strength. See Building; Masonry.

Builth Wells. Urban district, spa, and market town of Brecknockshire, Wales. Near the confluence of the Irfon with the Wye, 16 m. N. of Brecon, it has three railway stations, one lying 1½ m. to the N., in Radnorshire, and the other two at Builth Road, which is 1½ m. to the N.W. The medicinal springs, saline, chaly-

beate, and sulphurous, are no longer used. It holds fairs for ponies and sheep. Of its historic castle, twice destroyed, only the earthworks remain. Market day, Mon. Pop. (1951) 1,708.

Built-up Area. In the U.K. an area on the road in which there is in force a speed limit of 30 m.p.h. for motor vehicles. A road is in a built-up area if there are street lamps not more than 200 yds. apart, unless the minister of Transport directs to the contrary. Any other road may be declared to be in a built-up area. Horns may not be sounded in a built-up area from 11.30 p.m. to 7 a.m. except by police and similar vehicles.

Buisson, FERDINAND (1841-1932). French educationist. Born in Paris, he became director of state primary education 1870 and professor of education at the Sorbonne, 1896. He sat in the chamber of deputies 1902-14 and 1919-28. An early advocate of the League of Nations, he received the Nobel peace prize, 1927. He died Feb. 16, 1932.

Buitenzorg. Town of Java, Indonesia, situated 35 m. by rly. S. of Batavia (Jakarta). A hill-station, 875 ft. high, it has a palace once the summer residence of the governor-general of the Netherlands Indies. Its botanical garden is famous. Tea is grown on the hillsides round the town; the soil is volcanic. Pop. (est.) 70,000.

Bukarest (Rum. București, the city of enjoyment). Capital of Rumania. Backed by a low line of hills to the W. and S.W., Bukarest is situated in a marshy plain on the river Dombovița, a tributary of the Danube which lies some 30 m. to the south. Bukarest became a region under the administrative re-organizations of 1950 and 1952. It is surrounded by a ring of fortifications constructed in 1885 by the Belgian engineer H. A. Brialmont (1821-1903). Among imposing buildings dating from before the First Great War are the former royal palace, the national theatre, the university (founded 1864) and many other educational institutions and libraries, as well as more than 120 churches. After the Second Great War a new theatre for opera and ballet, an immense new cinema, and a large exhibition hall were built on the Floreasca marshes; Bukarest University was extended; and a sports stadium, with seating for 80,000, was constructed. New housing areas were developed in Ferentari district,

able oilfields to Germany. These agreements were annulled by the peace treaties of 1919 between the Allies and the Central Powers.

Bukhara OR BOKHARA. City of Uzbek S.S.R., capital of a region of the same name. On a branch of the r. Zerafshan, Bukhara city is one of the chief commercial towns and the principal Islamic centre of central Asia, with numerous mosques and fine bazaars. It has Muslim schools and colleges of theology, law, and medicine, and has long been famous as a seat of learning. It makes cotton, silk, and leather goods, hosiery, karakul fur, and cutlery. Pop. (est.) 60,000. About 9 m. S.E. is Kagan (formerly called New Bukhara), on the Transcaspian rly. Bukhara region, area 49,600 sq. m., pop. (est.) 465,000, grows cotton.

Bukhara city was the capital of the former independent emirate of Bukhara, brought under Russian suzerainty in 1873. It kept its emir until 1920 when he was deposed by the Soviet government; in 1924 it was included in Uzbek S.S.R.

Bukharin, NIKOLAI IVANOVICH (1888-1938). Russian politician. Educated in Moscow, Bukharin joined the Communist party in 1904 and was exiled to Siberia by the government in 1910. He escaped and joined Lenin in Austria, where they published *Pravda* (*g.v.*). During the First Great War he worked with revolutionary parties in the U.S.A., Scandinavia, and Switzerland. In Russia, after the October Revolution of 1917, he became a member of the higher economic council and editor of *Pravda*. President of the Communist International, 1926, he was removed in 1928 as a suspected follower of Trotsky. Despite Bukharin's opposition to the liquidation of the Kulaks, he was readmitted to the party, and in 1934 became editor of *Izvestia*. In 1937 he was put on trial by the central committee, and, although refusing to admit anti-Soviet activities, was found guilty of betraying the Communist cause and executed March 15, 1938.

Bukkum-wood. Timber of the sappan tree (*Caesalpinia sappan*), of the family Leguminosae. The tree is native to tropical Asia, and grows to a height of 40 ft. It has prickly branches, with leaves divided into 10 or 12 pairs of oval leaflets, and clustered sprays of yellow flowers. The dull-red wood is used as a dyestuff. An orange dye is obtained from the roots.

Bukkur. Fortified island of W. Pakistan. It lies in a bend of the

river Indus, between Sukkur and Rohri. An oval limestone rock, 800 yds. long by 300 yds. wide, and 25 ft. high, it has always been an important strong point and is almost covered by an ancient fortress. It supports the Lansdowne rly. bridge and telegraph line.

Ceded to the British in 1839, it was used as the principal British arsenal during the Afghan and Sind campaigns.

Bukoba. Port of Tanganyika. East Africa. Situated on the W. shore of Victoria Nyanza, 23 m. S. of the Uganda border, it is in Lake prov. and is h.q. of Bukoba district. It has lake steamer and air communication with Mwanza, Kisumu (Kenya), and Entebbe (Uganda). The r. Kagera flows across the district in the N., and the main road from Masaka (Uganda) traverses it from N. to S.; a proposed highway would link Bukoba with Abercorn (N. Rhodesia). Coffee is grown by African farmers; tin and wolfram are worked; hides and skins exported. Pop. (1948) dist., 301,665.

Bukowina OR BUKOVINA. Region of S.E. Europe. Mainly mountainous, it lies towards the E. end of the Carpathians, and is bounded roughly by the Dniester on the N., the Bialy Czeremosz on the W., and the Moldava on the S.; area, some 4,000 sq. m. The people, perhaps a million, include Ruthenes, Rumanians, Poles, Germans. Cernauti was formerly the capital. The country yields wheat, maize, rye, oats, barley, flax, and hemp. Manganese and salt occur.

Under the Turks the Bukowina was part of Moldavia. Occupied by Russia in 1769 and by Austria in 1774, it was ceded to Austria by Turkey in 1777. In 1849 it was given a separate administration and became quasi-autonomous. Before the collapse of the Austro-Hungarian dual monarchy in 1918 it formed a duchy, bounded by Galicia to the N. and Hungary to the S.W. The Bukowina was the scene of violent fighting between Austrians and Russians in the summer of 1915; the Russians were driven out in July-Aug., 1917.

The Bukowina was joined to Rumania on Nov. 28, 1918, this change being confirmed in the treaties of St. Germain and Trianon; and in that kingdom it became part of the department of Suceava. On June 26, 1940, Russia delivered an ultimatum to Rumania demanding the cession of N. Bukowina with Bessarabia; this was accepted, and N. Bukowina became part of Ukraine

S.S.R. Its cession was confirmed in the peace treaty of 1947.

The part of Bukowina left to Rumania became the region of Suceava, a triangle of territory in the region of Iasi (Jassy).

Bukuru. Town of Nigeria, British West Africa. It is in the tin-mining area of the Plateau prov. in the Northern region, and lies 10 m. S. of Jos. It has rly. communication with Port Harcourt via Kafanchan.

Bulair. Town in the N.E. part of the Gallipoli peninsula, Turkey-in-Europe. Taken by Suleiman Pasha about 1356, it was the scene of fighting in the first Balkan War, and of the armistice arranged on April 19, 1913. During the Dardanelles operations in 1915 the Bulair lines were bombarded by French warships.

Bulandshahr. District and town of India. The district lies in the Meerut div. of Uttar Union, just S. of Delhi, between the rivers Jumna and Ganges; area 1,889 sq. m. The Ganges Canal traverses the district from N. to S., and the Hindan is the chief river. The district was invaded by Mahmud of Ghazim in 1018, and converted to Islam soon after. An alluvial plain, well cultivated and irrigated, it produces indigo, cereals, cotton, etc. Pop. (1951) 1,499,884.

The town of Bulandshahr (high town), formerly called Baran, is 40 m. S.E. of Delhi. A city of great antiquity, it is the site of Buddhist remains dating from the 7th-5th centuries B.C. The town flourished for some time in the 11th century A.D., but declined under the Muslims. It revived under British rule, when it was made the district h.q. It is a local trade centre for agricultural produce. Pop. (1951) 37,496.

Bulawayo (formerly Gubulawayo). City of Southern Rhodesia. In the S.W. of the country, it is the chief commercial and industrial centre and, at an alt. of 4,450 ft., has a cool, dry climate. It is the h.q. of the Rhodesian rly. system and here the line from Cape Town, 1,355 m. to the S.W., branches N.W. to Livingstone (N. Rhodesia), 285 m., and on N. to Elisabethville (Belgian Congo), 944 m.; N.E. to Salisbury, 292 m., and on E. to Beira (Mozambique), 673 m. There is air communication within the Federation of Rhodesia and Nyasaland, and with Johannesburg, Nairobi, Beira, and London.

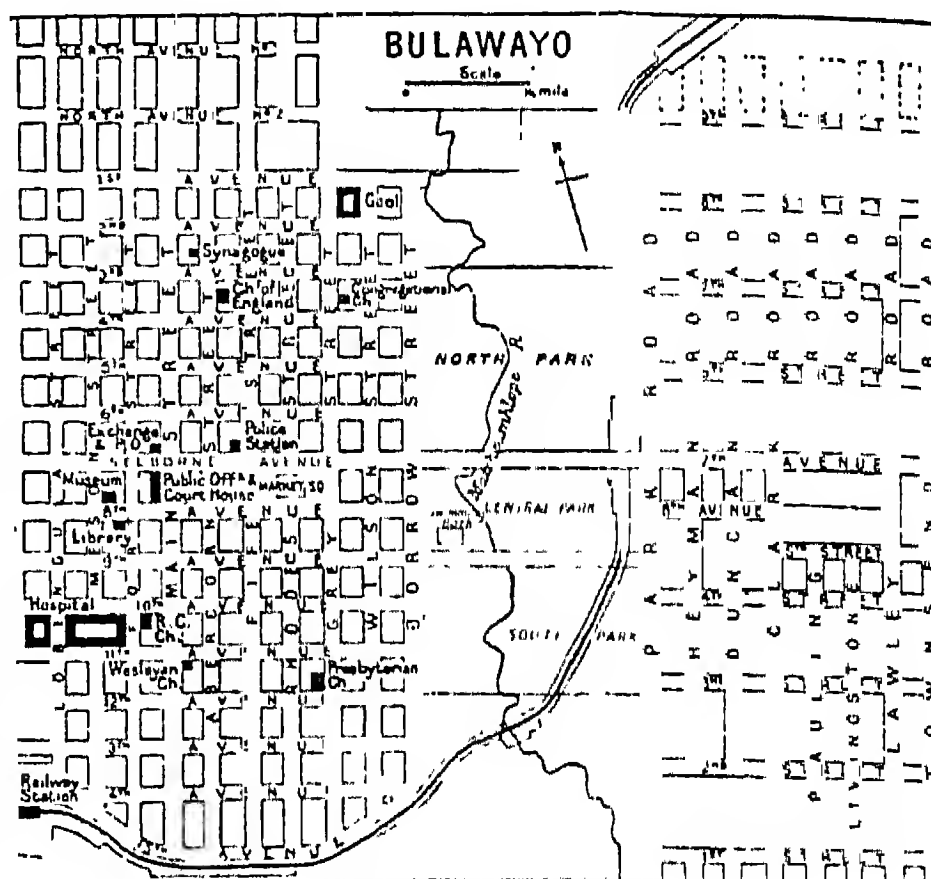
Among Bulawayo's many industries are heavy and electrical engineering, steel and cutlery making, brewing, sugar refining, printing, and the manufacture of clothing and textiles. There are

also brick works and cement factories, and a cold storage plant; and the city is the centre of an extensive goldmining, cattle-ranching, and maize-growing region. The industrial area is in the south-west, the residential area to the north.

Bulawayo has been built on a rectangular plan, the thoroughfares running N. to S. being called streets or roads, those from E. to W. avenues. Separating the business section from the suburban district on the E. are the municipal park and botanical gardens, through which flows the Matsheumhlope river. Among public buildings are the city hall, erected in 1940 on the site of the old market house, the high court, and the public library; the national museum, opened 1910, contains collections relating to the natural history, geology, pre-history, and ethnography of Southern Rhode-

sia. Standing at the junction of Main St. and Selborne Avenue is a monument commemorating 257 victims of the Matabele rising of 1896; and at the junction of Main St. and 8th Avenue is John Tweed's bronze statue of Cecil Rhodes.

Bulawayo has primary, secondary, public, and convent schools, and a govt. technical college. There is a comprehensive municipal health service with a large general hospital and six others. Water is piped from the Khami dam (11 m.) and the N'cema dam (33 m.). Bulawayo's



Bulawayo. Government House



Bulawayo. The building housing the High Court

market is the biggest in Central Africa.

Two miles from the city centre is Government House, erected on the site of Lobengula's royal kraal, which was burned down in 1893, and approached through an avenue of trees more than 1½ m. long. The Khami ruins, an abandoned settlement probably of late medieval date, lie 13 m. W. The original Bulawayo was the principal kraal of Lobengula, last king of the Matabele; the name means the place of the killing. The present town, founded in 1893, was raised to the status of a city in 1943. It is administered by a mayor and city council (12 members). Pop. (1951) 82,430, of whom 27,550 were Europeans.

Bulb. Fleshy, underground, perennating organ of many monocotyledonous plants. A bulb is really an enlarged bud, the scales of which are attached to a tiny stem and are swollen with food reserves. Bulbs are of two main types: imbricated, where the fleshy scales overlap one another, as in the bulb of a lily, and tunicated, where each scale encircles the stem and the younger scales within it, as in the onion. The term bulb is sometimes loosely used to describe the corm of such plants as the crocus and the rhizome of an iris, but these are stem structures and not buds. Among the popular spring flowering bulbs are daffodil (*Narcissus*), hyacinth, lily, snowdrop, and tulip. They should be planted in the autumn, the bulb being covered with soil to a depth about equal to its own height (*see* illus. opposite).

Bulbs are propagated both sexually by seed and asexually by the formation of small bulbs attached to the main bulb.

Bulbul. A bird belonging to the family Pycnonotidae, of which various species are found in the



Bulbul. Bird of the Near and Middle East

near, middle, and far East, and in Africa. Generally they are dull in colouring, though some have a brilliant plumage, for instance the fairy bluebird (*Irena puella*) of Java.

The bulbul of the Persian poets is probably *Luscinia haffizi*, a nightingale.

Buldana. District and town of Bombay, India. The district, area 3,660 sq. m., is hilly, with fertile valleys producing cotton, sugar, and vegetables. Teak forests are found on the hills. The town of Buldana is on the Penganga river, 32 m. N.E. of Assaye, on the N. edge of a high plateau, at an alt. of 2,190 ft.; it weaves cotton, and mills oilseeds. Pop. (1951) dist., 870,168.

Bulfin, SIR EDWARD STANISLAUS (1862-1939). British soldier. The son of an Irish landowner, he was born Nov. 6, 1862, and educated at Stonyhurst and Trinity College, Dublin. In 1884 he entered the Yorkshire regt. (the Green Howards), of which he was colonel from 1914 until his death. He served in Burma during 1892-93, and in the South African War 1899-1902. After holding a military post in Cape Colony for four years, he commanded an infantry brigade at home. Bulfin went to France in Aug., 1914, and in 1915 he led the 28th division during its desperate stand at Ypres in the spring. In 1917 he was transferred, at the head of an army corps, to Palestine, where he served under Allenby until the end of the campaign. He was knighted in 1918, promoted lieutenant-general 1919. Commander-in-chief in Egypt, 1919, he became a full general 1925 and retired 1926. He died Aug. 20, 1939.

Bulford. Parish and village of Wiltshire, England. It is on the river Avon, 2 m. N.N.E. of Amesbury. There is a large military camp here. Pop. (1951) 5,123.

Bulganin, NIKOLAI ALEXANDROVICH (b. 1895). Russian politician. Born at Nijni Novgorod June 11, 1895, son of a bookkeeper, and educated at the technical school there, he joined the Communist party in 1917; worked in the Cheka 1918-22; was director of Moscow electrical works 1927-30; chairman of the council of people's commissars and head of the state bank 1938-41, and a member of the military council 1941-44. He became a member of the politburo 1946, and in 1947 he was made a marshal of the Soviet Union. Minister of defence in the government set up after Stalin's death in 1953, he

became chairman of the council of ministers (i.e. prime minister) in 1955. During 1955-56, accompanied by Nikita Krushchev, first secretary of the central committee of the Soviet Communist party, Bulganin made a number of visits



Nikolai Bulganin, Russian politician

abroad, his chief journeys being to Belgrade, where he re-entered into relations with President Tito; Geneva, for a conference with President Eisenhower. Sir Anthony

Eden (British prime minister), and Edgar Faure (French prime minister); India; the United Kingdom; and Egypt.

BULGARIA: THE LAND AND ITS PEOPLE

This outline of the geography and history of Bulgaria traces its development from a Roman province to a tsardom and then to a Communist republic. See also the articles on the Balkan Peninsula; Sofia and other towns; the Danube river; and Bulgarian personalities e.g. King Ferdinand, King Boris, Georgi Dimitrov

Bulgaria is a republic of the Balkan peninsula. It is bounded N. by Rumania, with the river Danube for the most part as the natural frontier; E. by the Black Sea; S. by Turkey-in-Europe and Greece; W. by Yugoslavia. It has an area of 42,796 sq. m. Pop. (1946) 7,022,206.

Bulgaria, like the rest of the Balkans, is a mountainous country. Mountains and hilly regions comprise 60 p.c. of its land surface, and the most striking natural feature of the country is the great chain of the Balkan Mts., dividing it into north and south Bulgaria. Called by the Bulgarians the Stara Planina (anc. Haemus), the Balkan range crosses the country from W. to E. The eastern section gradually decreases in height, falling away into the Black Sea at Cape Eminé, and is broken by a number of passes, the Shipka, the Baba Konak, and the Isker valley being

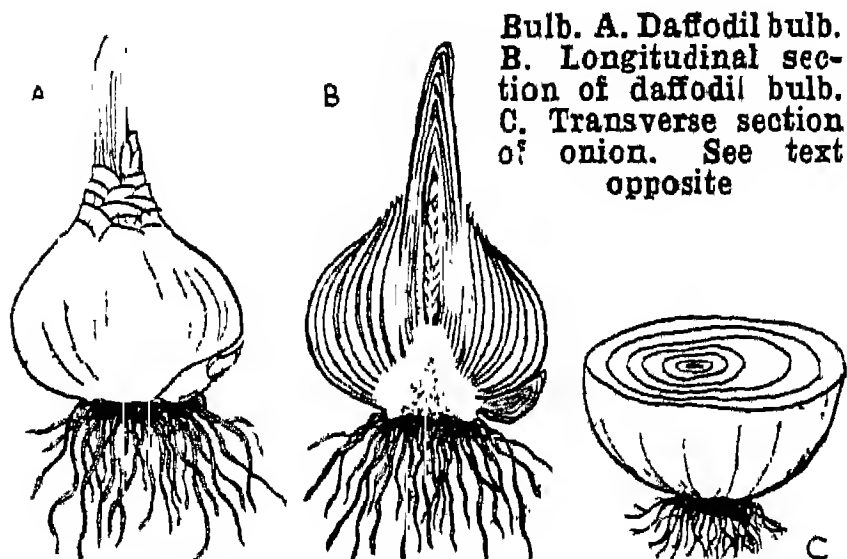
the most important. The Balkan Mts. are a continuation of the Carpathian range to the N.W., and lie south of and parallel to the Danube at a distance of some 60 m., descending, often in sharp escarpments, on their southern side, and sloping more gently to the fertile river plains on the N.

The other great mountain range of Bulgaria, the Rhodope Mts., of which the highest peak is Moussala, 9,631 ft., is connected with the Balkan Mts. through the Malka Planina near Sofia, but it is an entirely separate range, part of the great Alpine fold, and gradually decreases S.E. and E. along the southern frontier. Between the two ranges lies the fertile Rumelian plain, the main agricultural region of the country.

The most important river to Bulgaria is the Danube, the international waterway on its northern frontier, which carries most of Bulgaria's river commerce; Rustchuk (Ruse) is the main river port. Swift mountain tributaries of the Danube—the Lom, Ogust, Vid, Osem, Yantra, Eastern Lom, and Isker—descend from the Balkan Mts. and water northern Bulgaria. The Rumelian plain is watered by the Maritsa and its tributaries the Tunja and the Arda; the Maritsa and the Struma flow to the Aegean Sea.

Bulgaria was once famous for its forests, but the old oak forests disappeared under the Turks. The dwarf oak and the beech remain plentiful in the existing 8,000,000 acres of forest land.

Bears and wolves are still to be found in the remoter parts of the country, as well as jackals, wild cat, red and roe deer, and chamois. There is wild game of all kinds, and



Bulb. A. Daffodil bulb. B. Longitudinal section of daffodil bulb. C. Transverse section of onion. See text opposite

mackerel and turbot are prolific in the Black Sea, where there is a considerable amount of fishing although the Bulgarians are not a maritime people.

The climate in general, like that of most other parts of the peninsula, is marked by extreme cold in winter and hot summers. North of the Balkan Mts. the winters are bitter; in the more protected Rumanian plain spring is earlier, summer is exceedingly hot, and autumn is warm and clear.

The capital of Bulgaria is Sofia, near the r. Isker (pop., est., 437,000). Other important towns are Plovdiv, 127,000; Varna (Stalin), 77,000; Rustchuk (Ruse), 54,000. Towns of lesser importance are Stara Zagora, Sliven, Kolarovgrad (Shumen), Dobrich (Tolbukhin), and Jambol. Sofia city is a separate administrative unit; the rest of the country is divided into 12 provinces each named after its chief town: Sofia, Burgas, Blagoyevgrad, Tirnovo, Pleven, Plovdiv, Ruse, Varna (Stalin), Stara Zagora, Khaskovo, and Kolarovgrad.

Origins of the People

The Bulgarian people, descended from the Slavs who occupied the country during the 3rd-6th centuries A.D., intermixed with Tartar blood from the Turanian tribes which conquered them in the 7th century, are an industrious and tenacious people, long-lived, more taciturn and less gay than their neighbours in the peninsula. The overwhelming majority belong to the autonomous Bulgarian Orthodox Church. It is estimated that there are about 100,000 Muslims; there are also Jewish, Armenian, Gypsy, and Turkish minorities. The independent Bulgarian patriarchate, which was abolished in 1393, was re-established in 1953.

AGRICULTURE AND INDUSTRY. Until the end of the Second Great War Bulgaria was essentially an agrarian country of small peasant holdings worked on a primitive system of agriculture. Wheat and maize are the principal agricultural products; the vine and other

fruits are cultivated, cotton, sugar, and tobacco are important commercial crops. The valleys are famous for their gardens, and the production of otto (or attar) of roses is a Bulgarian monopoly as far as Europe is concerned; Bulgarian otto is considered to surpass in fragrance and strength that of Persia and India. After a Communist government came to power in 1947 nationalisation of the land was introduced. By 1955 between 60 and 65 per cent. of the total acreage of arable land had been nationalised, and it was estimated that about 52 per cent. of peasant households lived by collective farming. Mechanised state farms were also set up, and the Bulgarian part of Dobruja was being developed as a single collective farm.

Development of Industry

Industry began to be developed after 1946, with a consequent shift of population from country to town. Among new industries were electrical engineering, shipbuilding, manufacture of cellulose and heavy chemicals, food processing and other light industries. In 1948 the state took over ownership of all industrial enterprises; communications, electrical undertakings, mines, banking, and foreign trade also were nationalised.

Bulgaria possesses extensive mines of somewhat inferior coal. Aluminium and salt are worked, iron and copper ores are mined; petroleum deposits exist.

Development of hydro-electric power also started, notably at two stations on the r. Chaia near Plovdiv. One thermo-electric station is in operation at Sofia, another, completed 1951, at Dimitrovgrad (Rakovski). The Vasil Kolarov dam in the Rhodope Mts. supplies water for the irrigation of some 80 sq. m. in the Plovdiv plain.

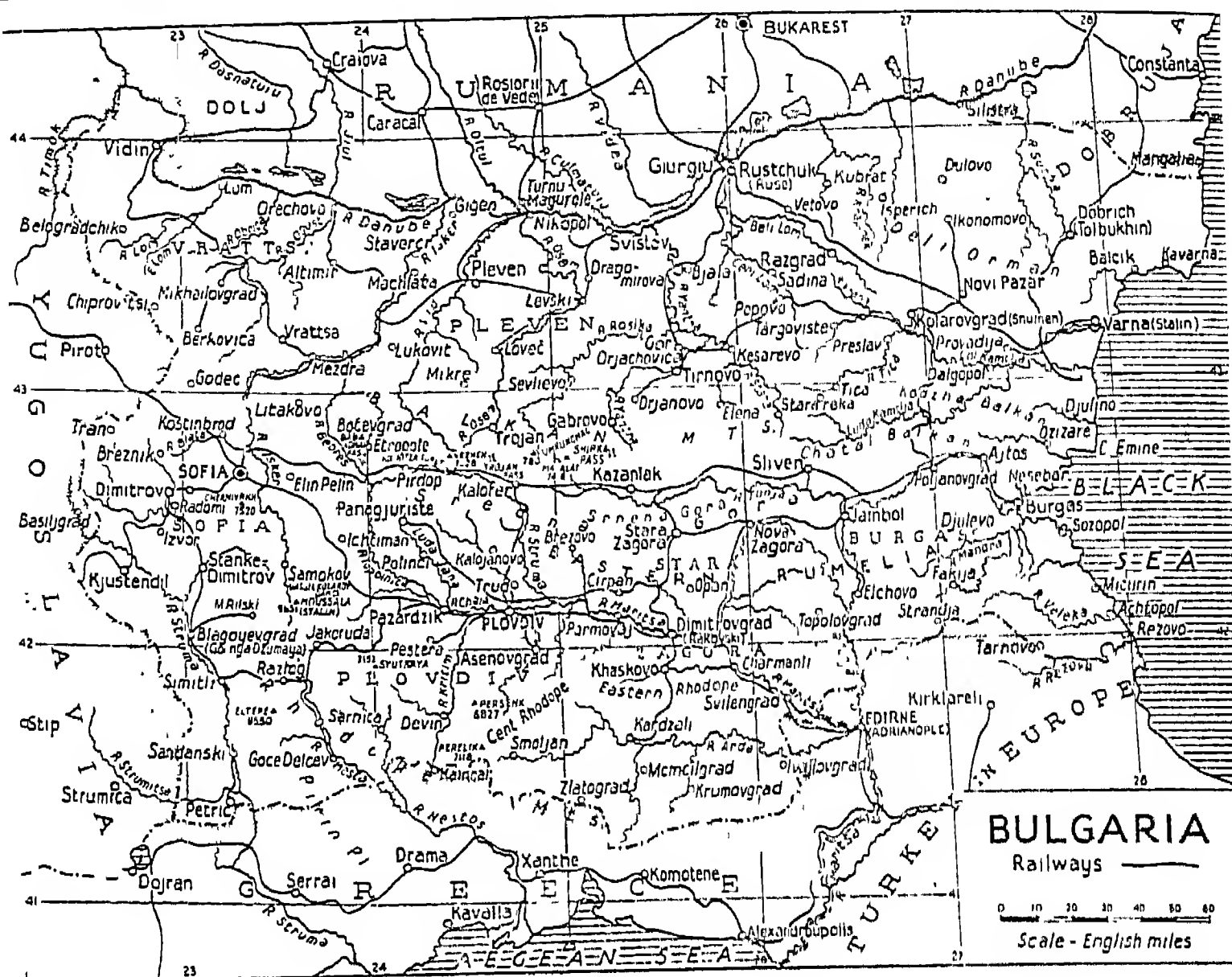
New railway lines constructed after the war include a line linking Sofia with the Black Sea port of Burgas; the Koznitsa tunnel, largest in the Balkan peninsula, forms part of this route. A new railway and road bridge over the Danube between Rustchuk in Bulgaria and Giurgiu in Rumania was opened in 1954.

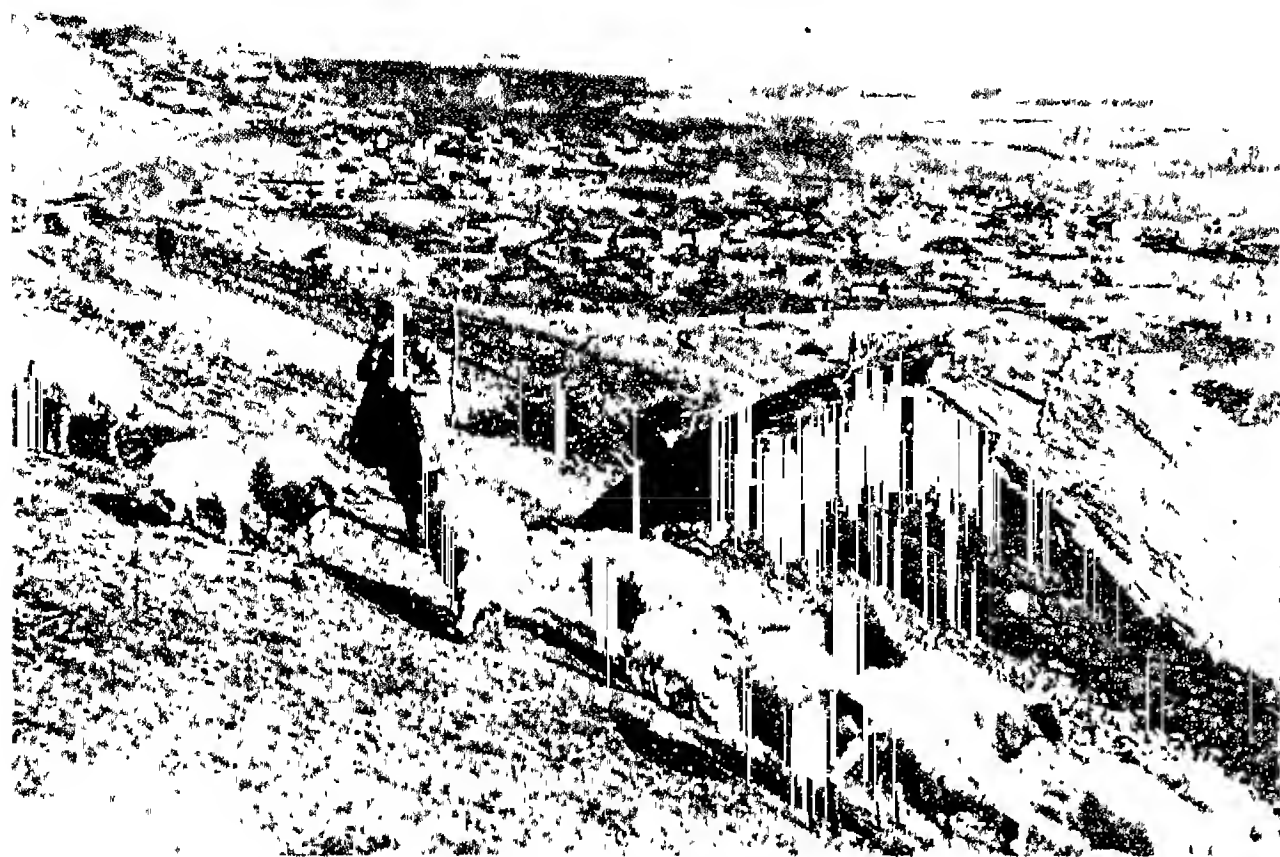
Air services link Sofia through Bukarest with Moscow, and through Budapest with Prague; internal services connect the capital with Plovdiv, Burgas, and Varna.

Exports and Imports

Bulgarian exports, organized by various state enterprises, include fruit, tobacco, ores and metal, grain, otto of roses, textiles, and finished woods; among imports are machinery and industrial, electrical, and agricultural equipment, oil, and chemicals. The bulk of Bulgarian trade is with Russia and the other Communist countries of eastern Europe.

CONSTITUTION. By the constitution of Dec. 4, 1947, Bulgaria is a republic with a president. It





Bulgaria. Shepherd tending his flock on the hills of S. Bulgaria



Bulgaria. The Rila monastery, founded in the 10th century



Bulgaria: types of its people. 1. A girl from Plevna. 2. Bridal couple arrayed in ceremonial dress. 3. A country lad

has a single-chamber parliament, the grand national assembly, with one deputy to every 30,000 citizens, who are entitled to vote from the age of 18. Deputies are elected for four years. The presidium consists of one chairman, two vice-chairmen, a secretary, and 15 members; it is responsible to the assembly, which has the power to change its composition at any time. The 12 provinces are sub-divided into 95 rural districts, and there are seven municipalities.

Elementary education is compulsory, and illiteracy, prevalent in the country before 1945, has been much reduced. The 20 institutions for higher education functioning in 1955 included the rebuilt and expanded Sofia University; they catered for some 135,000 students.

HISTORY. The region now called Bulgaria was roughly contiguous with ancient Thrace and, with the rest of the Balkan peninsula, was conquered by the Romans in the 1st century B.C. and became, as the Roman province of Moesia Inferior, part of the Roman Empire, later of the Byzantine Empire. During the 3rd-6th centuries A.D. Slav tribes raided and then settled in Moesia Inferior, and gradually absorbed or drove out its earlier inhabitants. In the 7th century they in turn were conquered by the Bulgars, a Turanian tribe originally hailing from Asia, who set up a Bulgar state. In the course of the next two centuries the Bulgars were absorbed by the Slav inhabitants, and the people remain essentially Slav in their language and their tradition to this day.

Periods of Expansion

The two great periods of Bulgar history were those of the first kingdom, 640-1018; Asparuch, Krum, and Simeon greatly extended the boundaries of their kingdom in constant wars with the Serbs and the Byzantine Empire. A period under Byzantine control was followed by a second period of independence, 1186-1396, under the Asen brothers and their successors; though the struggle with Byzantium and the Serbs continued.

In 1396 Bulgaria fell to the advancing Turks, and until 1878 formed part of the Turkish Empire. The Bulgarians continued to be a purely pastoral and agricultural people under their overlords; and they provided the Turkish army with its best recruits.



Bulgaria. Gathering flowers for otto of roses. Bulgaria is by far the most important producer in Europe

In the course of centuries many Bulgarians abandoned the Orthodox creed to adopt the religion of their conquerors; these Muslims were called Pomaks.

As in the rest of the Balkans, an increasing demand for national independence made itself felt during the 19th century. In 1876 Turkey was hard-pressed by risings in Bosnia, and in the course of the Russo-Turkish war which developed some 12,000 Bulgarian villagers were massacred, which led Gladstone to launch his campaign against the "Bulgarian atrocities." The Russians espoused the cause of the Bulgarians, though forced by the Great Powers to withdraw their original plans for a greater Bulgaria; and at the Berlin Congress of 1878 a truncated Bulgaria, still nominally under Turkish suzerainty, was granted autonomy, Eastern Rumelia being left in Turkish hands.

The national assembly elected Prince Alexander of Battenberg as ruler of the country. In 1885 a revolution in Eastern Rumelia resulted in its union with Bulgaria, confirmed after the war with Serbia which followed; but under the pressure of Russian antagonism Alexander abdicated soon afterwards. Ferdinand of Saxe-Coburg was chosen in his place. For several years King Ferdinand remained in the background, and the country was ruled by Stephen Stambulov (1855-95), who followed an anti-Russian policy; but in 1894 Stambulov was dismissed by Ferdinand, and on July 18, 1895, was mysteriously murdered.

In these and the ensuing years railways, roads, telegraphic communications, industry, and modern buildings began to make their appearance. Ferdinand took over the reins of power, and in 1908, after the Young Turk revolution in Turkey, proclaimed Bulgaria independent and took the title of tsar. When the first Balkan League was formed in 1912, Bulgaria joined Greece, Serbia, and Montenegro

against the Turks, and successfully helped to expel them from all but a strip of coastal territory in the Balkans. But the victors then fell out over the disposition of the territorial spoils, and Bulgaria attacked her former allies. The result of the 2nd Balkan War was a decisive defeat for Bulgaria, and the country had to accept the terms of the 1913 Treaty of Bukarest (*q.v.*). (See also *Balkan Wars under Balkan Peninsula.*)

The First Great War

On the outbreak of the First Great War in 1914 Ferdinand attempted to retrieve his losses by throwing in his lot with the Germans; and when Allied victory was imminent in Aug., 1918, he fled the country, later abdicating in favour of his son, Boris. Sept.,

1918, saw the defeat of the Bulgarians by the Serbian and Allied forces. By the Treaty of Neuilly, 1919, Bulgaria ceded territory to Yugoslavia and Greece; and the Dobruja, which she had gained in 1918, was restored to Rumania.

For the next few years the country was controlled by Alexander Stambolisky (1878-1923), leader of the democratic Peasant party. Twice Bulgaria had tried and failed to take by force Macedonia, claimed as its own by both Bulgaria and Serbia. By his pacific overtures to the Serbs, Stambolisky incurred the enmity of the powerful Bulgar-Macedonian irredentist organization, which at one time was in virtual control of Macedonia; his democratic policy alienated the army and the upper classes; and on June 14, 1923, he was assassinated. His death was followed by the September rising of the peasants and their left-wing supporters; and the civil war which followed did not end until the establishment in 1935 of a dictatorship, with Boris at its head.

Under Boris's leadership, the country moved slowly but surely into the Nazi orbit. In March, 1941, Bulgaria adhered to the Axis pact; in April, after the German invasion of Greece, Bulgarian troops occupied Yugoslav Macedonia and Greek western Thrace; and in Dec., 1941, Bulgaria declared war on the U.K. and the U.S.A. It never declared war on Russia: the traditional sentiment for Russia was too strong. But German troops moved into Bulgaria, and used the country and its ports as a war base; they were increasingly harried by partisan forces which



Bulgaria. Dancing an Easter round dance in the little village of Dragalevtzi, near Sofia

sprang up in Bulgaria as in the other Balkan countries; it is estimated that 10,000 died in battle, and that more than 20,000 were imprisoned by the Germans and killed without trial.

On Aug. 28, 1943, Boris died suddenly on his return from a visit to Hitler. He was succeeded by his six-year-old son, Simeon II. A year later, with the Russians rapidly approaching the frontier, the Bulgarian government asked the Germans to leave the country, and attempted to maintain neutrality. On Sept. 5 Russia declared war on Bulgaria, and the government immediately asked for an armistice. The Russians crossed the frontier on Sept. 8, and on the same day Bulgaria declared war on Germany.

Bulgaria Becomes a Republic

A new government, composed of a coalition of Communists, Social Democrats, and Agrarians, took over control, and on Oct. 28 signed in Moscow an armistice with the Allies. In accordance with its terms, Bulgarian troops were withdrawn from Yugoslavia and Greece. A referendum held in 1946 ended the monarchy, and Bulgaria was proclaimed a republic. A peace treaty was signed in Paris on Feb. 10, 1947, effective Sept. 16, and a separate treaty with Rumania signed at the same time confirmed the cession to Bulgaria of the southern Dobruja, made by Rumania under Nazi pressure in 1940.

Georgi Dimitrov (1882-1949), hero of the Reichstag trial, 1933, returned to Bulgaria from Moscow and in 1946 took over the leadership of his country, which adopted in 1947 a new Communist constitution on the Russian model. It was one of the original members of the Cominform (*q.v.*), set up in Oct., 1947.

Bulkhead. Term used in engineering. In marine engineering bulkheads are the longitudinal and transverse partitions dividing the internal space of a ship into watertight compartments, with a view to minimising the danger of sinking if the shell is breached. On men-of-war the bulkheads are fitted with watertight doors, to provide communication between the various compartments. The bulkheads nearest the stern and bows are called collision bulkheads. On British warships and many liners the main bulkheads can be closed by means of controls from the bridge, the watertight doors being provided

with small picket doors to enable persons trapped in the bulkhead space to escape. On warships the bulkheads are so arranged that the ship virtually has a double hull. The term bulkhead is also applied to the transverse divisions in large aircraft. Sea walls are called bulkheads, as are the vertical partitions employed in tunnelling.

Bulk Modulus. The resistance to compression offered by any material when a uniform pressure p is applied to the whole surface of a solid of original volume V_1 and final volume V_2 . The bulk modulus, alternatively called the modulus of volume elasticity, is then defined as

$$\frac{p V_1}{V_1 - V_2}$$

Bull. Male animal of the Bovidae family, kept for breeding and fattening. Roughly speaking, a



Bull. "Tarrington Punch," a fine specimen of the Hereford breed

bull for a pedigree milk herd must be descended from a long line in which the cows have yielded much milk for many generations, since a bull passes on this feminine quality to its daughters from its mother. A bull intended as a sire of beef cattle should be well developed in back, loin, and thighs, the skin soft and not too thick, the hair fine. The word is applied to the males of other large mammals such as the elephant and whale.

Bull (Lat. *bulla*, bubble, boss). Term used in the Middle Ages for the capsule of a seal, then for the seal itself, and so for the document to which the seal was attached. In this last sense it was applied to documents containing the public pronouncements of emperors, kings, and popes, the more important of these sometimes being sealed with a seal of gold (see Golden Bull).

The term is now confined to papal bulls. A papal bull is a letter of the pope written in solemn form, in Latin, on parchment and sealed with a leaden seal. It differs from a brief (*q.v.*), which is less solemn in form. A bull is designated by the first

words of its introduction. Among famous examples may be mentioned *In Cena Domini*, promulgated by Urban V in 1362 against heretics; *Unigenitus*, by Clement XI, 1713, against the Jansenists; *Sollicitudo Omnium*, by Pius VII, 1814, re-establishing the Jesuit order; *Ineffabilis*, 1854, proclaiming the dogma of the Immaculate Conception, and *Pastor Aeternus*, 1870, defining the infallibility of the pope, both by Pius IX.

Bull. In Stock Exchange language, a speculator who buys stock or shares for a rise, in the hope that before the time for payment comes he will have sold them at a profit. The opposite of a bull in this sense is a bear, one who sells for a fall, *i.e.* drives down the price of stock in order to buy it at a price lower than that at which he has contracted to sell. The idea is, apparently, that the bull tosses his victim upwards, while the bear tramples on him.

Bull. Result of a particular kind of verbal blunder, generally of a misuse of words or images in which a ridiculous contradiction in terms is comprised in a seemingly clear statement. Sydney Smith defined a bull as an apparent congruity, and real incongruity, of ideas, suddenly discovered; S. T. Coleridge defined it as "a mental juxtaposition of incongruous ideas with the sensation, but without the sense, of connexion." A propensity for bulls has long been attributed to Irishmen; indeed the word is said to be derived from the name of an Irish general. A well-known instance is that of the Irish gardener who said that an hour's rain would do more good now in five minutes than a week of it would do at any other time.

Bull, GEORGE (1634-1710). An English theologian. Born at Wells, he was educated at Exeter College,



George Bull, English theologian

Oxford. Ordained in 1655, he held the living of S. George's near Bristol, using the then forbidden Prayer Book services, which he knew by heart. In 1662 Clarendon made him vicar of Suddington, Gloucestershire. In 1685 Bull published his *Defensio Fidei Nicenae*. To Bossuet's polite inquiry why the author was not a Roman Catholic, Bull replied with a lively treatise on The Corruptions of the

Church of Rome, 1705-7, which achieved a wider popularity than his earlier works. In 1705 Bull was made bishop of S. David's. He died Feb. 17, 1710.

Bull, JOHN (1563-1628). English composer. Appointed organist in the Chapel Royal in 1591, he was the first lecturer on music at Gresham College. In 1617 he became organist at Antwerp Cathedral. He was regarded as the composer of the National Anthem, and although this has been disputed, it seems to be admitted that one of his compositions contains the earliest form of the air. Consult Dr. John Bull, L. Henry, 1937.

Bull, OLE BORNEMANN (1810-80). Norwegian violinist. Born in Bergen, Feb. 5, 1810, Bull was almost entirely self-taught. In 1831 he went to Paris, where he met Paganini and Chopin and embarked upon his career as a violinist. He made his first public appearance in 1833, and for several years toured through Europe. In 1843 he went to the U.S.A., where he won immense popularity by his brilliant technique. He died Aug. 17, 1880, near Bergen, where he had built a national theatre.

Bull and Bush, THE. Famous inn at Hampstead, London, N.W. Known as Ye Olde Bull and Bush Hotel, and dating from the early part of the 18th century, it was rebuilt in 1923. The inn was said to have been the home of Hogarth. Addison, Gainsborough, Reynolds, Romney, William Hone, and Charles Lamb are among those who once forgathered here. It was a meeting-place of the old Hampstead Dining Club, 1784-1859, and of a skittle club, of which Sir J. D. Linton and other artists were members. Situated at a corner of Hampstead Heath, it is a favourite summer-time resort, and achieved new renown after 1903-04 through the popular chorus song, Down at the Old Bull and Bush. See Hampstead.

Bullard, SIR READER WILLIAM (b. 1885). British diplomatist. He was born Dec. 5, 1885, and held his first official post as acting vice-consul at Beirut in 1910. After a career in the diplomatic service in the Middle East, Greece, and Russia, during which he was knighted 1936, he was appointed in 1939 British minister (later ambassador) to Persia. It thus fell to him in 1941 to deliver to Reza Khan the British demand for the suppression of Axis activities in Persia. He resigned from the embassy 1946.

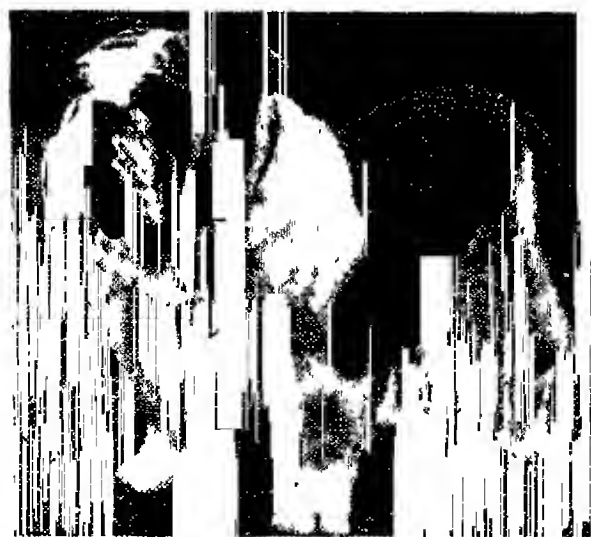
Bull Baiting AND BULL RUNNING. Two barbarous forms of sport. In the first a bull was tied to a stake by a rope about 4 yds. long, and baited by a mastiff or dogs specially trained for the purpose. In the second a bull, after being excited by the blowing of pepper into its eyes and nostrils, was turned loose in a town and hunted through the streets by the inhabitants. This was supposed to improve the quality of the beef. Many laws and customs were introduced in regard to these sports, which in England continued intermittently until 1835, when they became illegal.

Bulldog. One of the oldest of distinctively British dogs. Down to the 18th century it was mainly used for bull baiting, whence its name. The underhang of the lower jaw enabled it to cling to the bull's muzzle with a lock bite exceedingly difficult to loose. Surly and unsociable, it possessed, however, indomitable courage.

The modern breed, although descended from the fighting bulldog, differs as much in appearance as in disposition from its ancestors. Selection for shortness of nose and for docility has made it extremely difficult to rear, and deprived it of all its fighting qualities. It is a gentle and good-natured animal and quite useless as a watchdog.

Its head is extremely wide and square, with a very deep indentation between the eyes, which are set widely apart. The face is short and the lower jaw projects so far forward and upward that the lower teeth usually project over the upper jaw.

Breeders have developed the chest of the bulldog to such a size and width that both breathing and heart action tend to be interfered with, and the bulldog is notoriously short-lived; nor can it stand heat. Parturition is often difficult owing to the very large head and shoulders of the puppies. The bent forelegs, set far apart, are an indication of great strength.



Bulldog. A champion specimen of this ancient British breed

Average weight of dogs is 55 lb. of bitches 50 lb.

Bulldog Drummond. Novel by Sapper (Lt.-Col. Cyril McNeile, 1888-1937), published 1920. Its hero, Hugh Drummond, was an ex-army officer of great resource and tenacity, with a taste for adventure and amateur detective work. The story was dramatised and ran for 439 performances at Wyndham's Theatre from March 29, 1921, Gerald du Maurier playing the lead. Ronald Colman took the part in the film version of 1930. Novel and film had several sequels.

Bulldozer. A power-operated machine for levelling ground. The machine consists of a petrol- or Diesel-driven engine moving on tracks and having mounted on the front a steel shield for pushing earth and boulders aside. The shield can be adjusted to any angle to the axis of the tractor and can be raised or lowered by the driver. During the Second Great War bulldozers were used on a large scale on all fronts for clearing rubble and demolishing road blocks. Bulldozers used in the latter stages of the war were protected and armed like tanks, and were employed in the front line to clear a way for the advancing armour and infantry. They were the first vehicles ashore on the Normandy beaches, June, 1944, where they were used to clear tank obstacles. The largest weighed 22 tons and were driven by engines developing 400 horse power. See Armoured Vehicles; Tank.

Bullen, ARTHUR HENRY (1857-1920). British editor and publisher. Born in London, son of Dr. George Bullen (1816-94), keeper of printed books at the British Museum, he was educated at Worcester College, Oxford. His editorial work was largely concerned with the Elizabethan dramatists. He was the first to collect and edit the works of John Day, 1881. This book was followed (1882-84) by a collection of Old English Plays—by Marlowe, Middleton, Marston, Peele, Beaumont and Fletcher. Lyrics from the Song Books of the Elizabethan Age, many of which he discovered in the music books at Christ Church, Oxford, came out in 1886-87, and his *editio princeps* of Thomas Campion was issued in 1889. In 1904, at Stratford-on-Avon, he established the Shakespeare Head Press, whence was issued in 1904-07 the ten-volume Stratford edition of Shakespeare. Bullen died Feb. 29, 1920.

Bullen, FRANK THOMAS (1857-1915). British author. Born at Paddington, April 5, 1857, from



Frank Bullen,
British author

the age of twelve he served on board ship, on whale-ships principally, and obtained a certificate as chief mate. From 1885-99 he was a clerk in the Meteorological Office.

In 1898 appeared his first and best book, *The Cruise of the Cachalot*, containing his experiences as a whaler. Many other books followed, including *Idylls of the Sea*, 1899, *The Log of a Sea Waif*, 1899, *The Men of the Merchant Service*, 1900, *With Christ at Sea*, 1900. He died at Madeira, March 1, 1915.

Buller. River and county of South Island, New Zealand. The river, rising in an Alpine tarn, is fed by the heavy rains of the Southern Alps and reaches the sea at Westport after a course of 105 m. The stream is swift and has many rapids; its valley provides a through route from Nelson to Westport, and the coach road is a wonderful feat of engineering. Near the mouth are the Westport collieries. The county is rainy and mountainous and borders the Tasman Sea. Pop. (1951) 10,501.

Buller, CHARLES (1806-48). British politician. Born at Calcutta, June 8, 1806, he graduated at Trinity College, Cambridge, and was called to the bar in 1831. He was M.P. for West Looe, Cornwall, 1830-31, and for Liskeard from 1832 until his death, Nov. 29, 1848. In 1838 he accompanied Lord Durham to Canada, and assisted in preparing Durham's famous report on British North America. Buller was made judge-advocate-general in 1846 and chief poor law commissioner in 1847.

Buller, SIR REDVERS HENRY (1839-1908). British soldier. Born at Downes, Devon, on Dec. 7, 1839, and educated at Eton, he entered the army as an ensign in the King's Royal Rifle Corps in 1858. He saw service in the Chinese War of 1860; the Red River Expedition, 1870; the Ashanti War, 1873; the war with



Sir Redvers Buller,
British soldier

the Kaffirs and the Zulus, 1878-79; the Egyptian War, 1882; and the Sudan Campaign, 1884-85. In the Zulu War he won the V.C. From 1887-97 he was at the War Office, and in 1898 was given the command of the 1st Army Corps at Aldershot.

On the outbreak of the Boer War in 1899 Buller proceeded to South Africa in command of an army of 70,000 men. After severe reverses at Colenso and Spion Kop, he succeeded in relieving Ladysmith, which he had previously advised Sir George White to surrender. Superseded by Lord Roberts, he returned to England in Nov., 1900, and resumed his Aldershot command. A year later, in consequence of an indiscreet speech dealing with his leadership in South Africa, he was relieved of command. He spent the remainder of his life in retirement, and died June 2, 1908. *Consult* Lives, W. Jerrold, 1900; L. Butler, 1909.

Bullet (Fr. *boulette*, little ball). Term employed to define the projectiles thrown by all types of fire-arms used by infantry or cavalry, and the missiles employed in shrapnel shell, case-shot, and some grenades. For the latter purposes bullets are still of spherical shape, but for direct employment as projectiles from fire-arms they are cylindro-conical. The calibre of a gun was formerly expressed by the weight of the bullet it fired, but is now designated by the diameter of the bore in decimals of an inch, or millimetres.

Spherical bullets were introduced early in the history of fire-arms, and survived until the barrels of muskets were rifled, when the difficulty of forcing a tightly-fitting bullet from the muzzle to the breech, in loading, rendered some modification imperative, if the rapid rate of fire essential for military use was to be attained. The earliest departure from purely spherical shape was the provision of a belt round the bullet, the spherical portion of the latter being an easy fit in the bore, and little effort being necessary to force the belt through the grooves of the rifling.

After 1800, while the rifle was gradually being adopted for military use, many expedients were tried in the way of using bullets smaller than the bore, which were expanded into the rifling by hammering on to a projection after being dropped to the breech end of the rifle. In 1835 Greener introduced an oval bullet, which was expanded by the propellant gas driving a hard metal wedge into the base. The British military

authorities considered it too complicated, but subsequently adopted the Minié bullet, based on the same principle. In 1841 a French officer, Delvigne, introduced a cylindro-conical bullet with a hollow base expanded by the propellant gas, the shape enabling a bullet of equal weight and smaller diameter to be used in the weapon.

The introduction of the needle gun led in time to the universal adoption of breechloading, and the elimination of the necessity for expanding the bullet. The adoption of cartridges containing the bullet and charge in a brass case made it desirable to reduce the weight of the ammunition, and in order to lighten the rifle there was a tendency to reduce the bore. This led to an increase in the length of the bullet in order to maintain some of the weight. The greater the length in relation to the diameter, the more rapid must be the rotation in order to keep the bullet nose on in flight, and consequently rifling with a more rapid twist became necessary.

After a certain stage even hard lead would not withstand the strain, and this led to the introduction of the nickel-cased bullet by a Swiss officer, Major Rubin. The higher velocities imparted by smokeless powder permitted a reduction of bullet weight with the same striking effect, and the lead core has been partially replaced by aluminium or paper. The hard nickel case prevents a high velocity bullet breaking up on striking animal tissue, such an effect being prohibited in civilized warfare by the Hague Convention. For use against animals or in savage warfare, where none but an explosive bullet has the required stopping power, the point of the nickel case is perforated or slit, such ammunition being known as Dum-Dum.

The British rifle bullet used in the Second Great War weighed 174 grs. and had a diameter of .303 in. It was gradually replaced by the .300 bullet weighing 170 grs. The use of bullets with a sharp point instead of a rounded nose, introduced by the Germans in 1905, was quickly followed by France and the other Powers. The effect was a much lessened wind resistance, giving a flatter trajectory and increased range. It is also more suitable for machine guns.

Both the First and Second Great Wars led to the introduction of new bullets and improvements in existing types; particularly tracer, incendiary, and armour-piercing bullets. Tracer bullets have the lead core replaced by a phosphorus

composition which discharges sparks through their base, so marking out the course of flight in the dark and allowing a quick correction of aim. Incendiary bullets to ignite petrol or gas containers were developed for use against aircraft and barrage balloons. The lead core is replaced by an incendiary agent, *e.g.* magnesium powder or a composition of antimony powder, shellac, and sulphur. The armour-piercing bullet has a hardened, steel-pointed core embedded in a softer metal to take the rifling. A .303 armour-piercing incendiary bullet could penetrate $\frac{1}{4}$ -in. steel from 600 yards.

Bullett, GERALD WILLIAM (b. 1893). British author. Born in London, Dec. 30, 1893, and educated at Jesus College, Cambridge, he made his reputation as a writer with *The Street of the Eye*, 1923. As a critic he became known by *Modern English Fiction*, 1926, and *The Story of English Literature*, 1935. Novels include *The History of Egg Pandervil*, 1928, and its sequels; *I'll Tell You Everything* (with J. B. Priestley), 1933; *The Jury*, 1935; *A Man of Forty*, 1940; *The Trouble at Number Seven*, 1952; *Windows on a Vanished Time*, 1955. He also wrote poems and short stories.

Bull-fighting. National sport of Spain, Mexico, and Spanish S. America. Practised in ancient Greece and Rome, it was probably brought to Spain by the Moors. Originally, the men fought from horseback, with lances; and in Spain it was the sport only of the aristocracy up to the 17th century, when professional bull-fighters began to be recruited from the poorer classes. The sword came into use instead of the lance, and the *matadores* (killers) fought on foot when professionalism came in.

In Spain bull-fighting takes place in a huge circus called *plaza de toros* (square of bulls). A procession of all the actors, with assistants gorgeously apparelled, and the gaily harnessed horses or mules destined to drag off the bodies of the slain, parades the sand-covered arena. It is headed by civic officials, one of whom ceremoniously demands the key of the bull-stables from the president of the *corrida* (course). A trumpet sounds, the arena is cleared, a door is opened, and a bull emerges, dazzled by the sunlight after the darkness of its pen. The fight is in the form of a four-act drama (there were three acts only until 1927);

In the first act, men on foot "run" the bull, waving red capes to incite him to charge and leap. During these manoeuvres the *matador* observes the animal's reactions, speed, and tricks of behaviour. In the second act the mounted pikemen (*picadores*) prod the bull with lances. At this stage the horses used to be horribly gored, but the law now insists that they shall be padded. (Also, the fact that the mounted men now come on in the second instead of the first act protects the horses from the bull's first blind charges.)

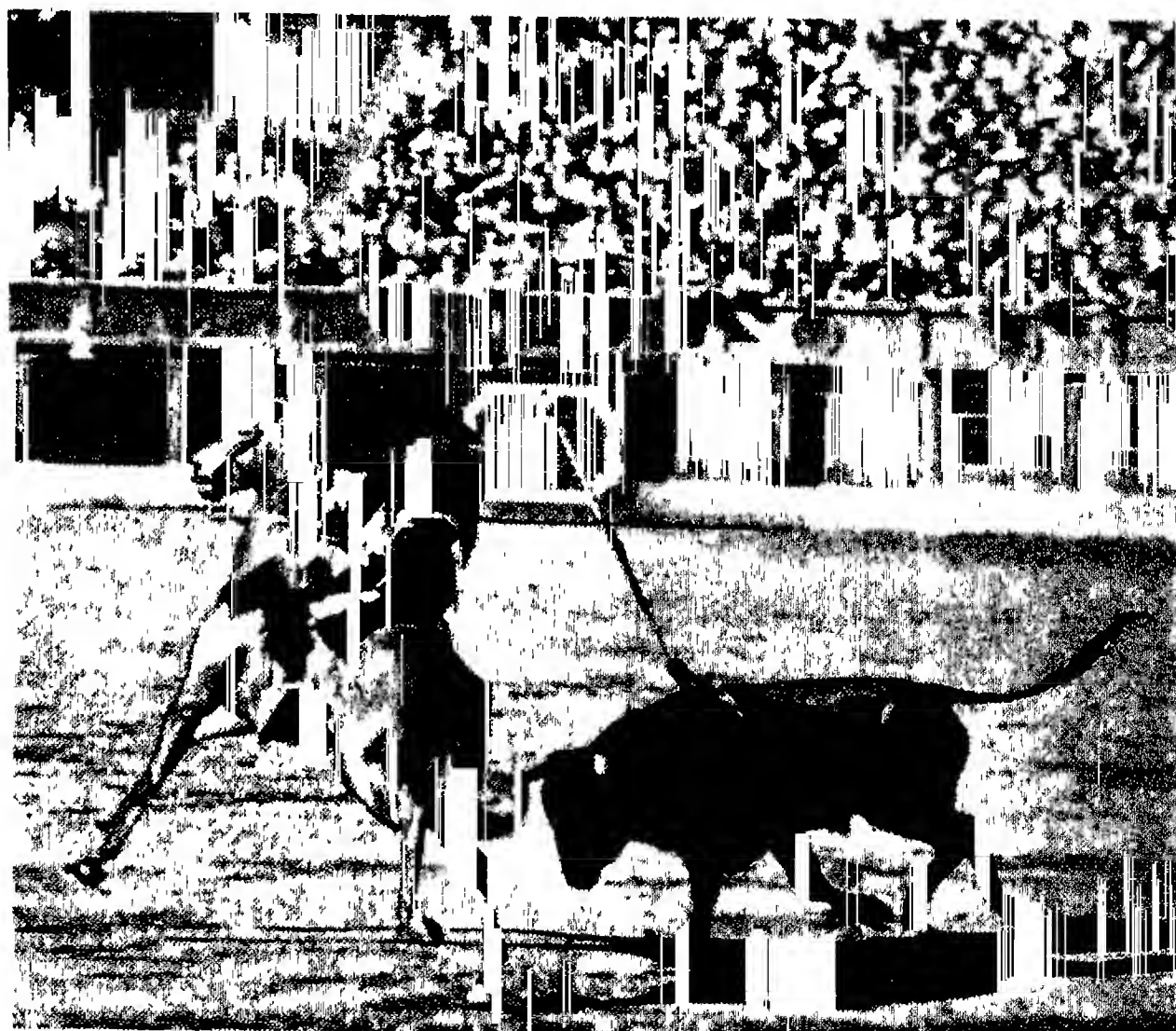
The third act consists in further tiring and irritating the bull by planting darts (*banderillas*) in his shoulders. This is done by *banderilleros*, men who, facing the charging beast, dart the barbs at him and slip nimbly aside. Those barbs are charged with crackers when the bull proves sluggish or cowardly. When the four darts have been implanted, the arena is cleared again and the fourth and last act begins. This time but one man, the *espada* (swordsmen) or *matador* attacks the bull. With his *muleta* (a small red cape on a stick) he plays the bull and brings it into position, so that a skilful sword-thrust pierces shoulder and heart and the animal falls dead at the *matador's* feet; but sometimes the reverse may happen: as when at Talavera in 1920 Joselito Gomez, the most popular bull-fighter in Spain in his time, was killed by the fifth bull of the day. Severely wounded bulls are dispatched with

daggers by *chulos*. Plaudits greet the successful death-stroke and hisses the unsuccessful, while favours and presents are showered on the hero of the day. The carcasses are dragged off, and the arena is fresh sanded or watered; trumpets peal, and the four acts are repeated, usually until six to eight bulls have been killed.

Bull-fights in Spanish South America are similar to those in Spain. In Portugal the horns of the bull are cut short and padded; the bull is not killed, and the fight is distinguished by a display of horsemanship. In the Camargue district of France a form of bull-fighting or bull-baiting is practised in which the bulls are not killed.

Spanish sovereigns and Spanish prelates have tried to suppress bull-fighting, but the love of it is deep-seated in the Spaniards. Successful *matadores* are popular heroes and earn huge sums, and bull-fights form part of state ceremonial. The breeding of bulls for the ring is a special industry, and flourishes chiefly in Andalusia. The bulls are lighter than British breeds, fiercer and much more active. There are over 240 bull-rings in Spain, the handsomest being those of Madrid and Seville. The costumes and accoutrements worn are historical in design, picturesque, rich, even gaudy.

The actions in playing the bull and the passes of the *picadores* and *matadores* have special names, and the traditions of the sport are punctiliously observed.



Bull-fighting. A picador, or mounted pikeman, prods the bull with his lance in the second act of the drama at a bull-ring at Santander

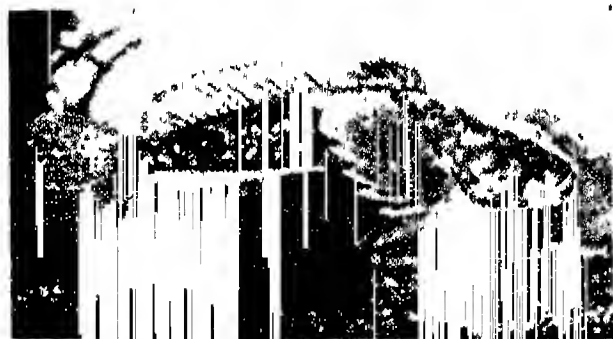


Bullfinch. European song-bird

Bullfinch (*Pyrrhula pyrrhula nesa*). European song bird, black and grey in colour, with a crimson breast in the male. It is common in many parts of Great Britain,

and used to be a favourite in captivity. The "piping bullfinch" was the ordinary species trained to imitate notes played on a whistle. The bird is about 6½ ins. long. Its main diet is the seeds of weeds—it is very partial to the berries of privet; in the spring it eats buds.

Bullhead (*Cottus gobio*). Small fish found in rivers and lakes of northern and central Europe. It is also called the miller's thumb, from its broad, flattened head. Usually it is only 3 to 5 ins. long. It feeds on small aquatic animals on which it pounces from the shelter of stones on the bottom of stream or lake. The female lays its eggs in a hollow scooped out from under a stone, and the male guards the eggs until they hatch



Bullhead. Small fish of north and central European rivers and lakes

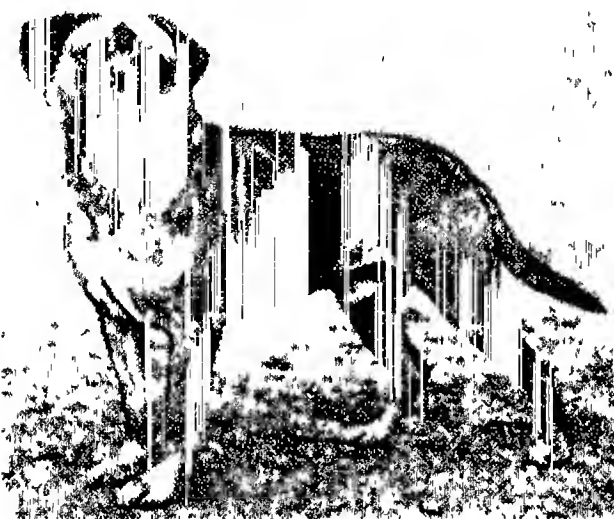
and the fry swim away. Certain marine species (*Cottus bubalis* and *C. scorpius*) are numerous in rock pools.

Bulli. Town of New South Wales, Australia, 59 m. by rly. S. of Sydney. It is a coal and coke centre. Soil from the Bulli area is used for making cricket pitches. Near by is Weber's Lookout, a thriving tourist resort, on the picturesque Bulli Pass. Pop. (1947) 2,478.

Bullinger, HEINRICH (1504-75). Swiss Protestant theologian. Born at Bremgarten, July 18, 1504, he studied at Cologne, accepted the Reformed doctrines, and became a pastor. He married an ex-nun in 1529, and in 1531, when Zwingli was killed in battle, succeeded him as chief pastor at Zürich. He assisted in the preparation of the first Helvetic Confession, 1536, and was chiefly responsible for the second, 1566. He had considerable influence on

reforming clergy in England, with many of whom he corresponded. His *Reformationsgeschichte* (history of the Reformation) was first printed 1838-40. He died at Zürich, Sept. 17, 1575.

Bullmastiff. Dog which developed from crossing the bulldog with the old English mastiff, in the first place to provide a good guard dog. Bullmastiffs gradually increased in popularity, and were first recognized as a distinct breed by the Kennel Club in 1925. Size, solidity, and strength are the characteristics of the breed, in



Bullmastiff. A champion of the breed

which dogs should measure 25-27 ins. at the shoulder, and weigh 110-130 lb., with corresponding figures of 24-26 ins. and 90-110 lb. for bitches. Heads are large and square, and bodies powerful but not clumsy. The short dense coat may be any shade of fawn or brindle. In character the bullmastiff is alert, active, faithful, and reliable, very affectionate with those it knows, and an excellent guard.

Bull-Roarer. Thin slat of wood, producing a very formidable noise when swung rapidly with a string. In Australia, covered with mystic emblems, it is used by the aborigines to warn women and children away from initiation ceremonies. There, as also in New Guinea, America, and W. Africa, it is used as a charm to produce wind and rain. In Sumatra and among the Bushmen it aids in driving cattle, a use traceable in central Europe and Great Britain. Used not only in the Greek mysteries (where it was called *rhombos*) but also by Palaeolithic man, this ancient device is now in many lands a child's toy.

Bull Run. Small stream in Virginia, U.S.A., noted because around it two battles were fought during the American Civil War (q.v.).

Bull Terrier. Strongly built, muscular, and active dog of medium size, possessing an oval shaped head with no "stop," the



Bull Terrier. A champion specimen

so-called downface, erect ears, and a strong muzzle. The back is short and strong, the chest broad. The colour is either white in which a trace of pigment on the head is not objected to, or coloured in which brindle should predominate. The coat is short and smooth.

The breed was made in England very early in the 19th century, from a cross of bulldog (then very different in appearance from the bulldog of today) with various terrier breeds. The result was later crossed with the old white English terrier (now extinct) to improve the appearance. In its early days the bull terrier, or bull and terrier as it was then called, was used in the rat pit, and in the brutal sport of dog fighting, on account of its indomitable courage.

The bull terrier combines great toughness and courage with remarkable fidelity and a great capacity for affection. Like other powerful breeds, it needs firm but kind handling and discipline; it is an ideal family dog.

The miniature bull terrier should be an exact replica of its larger brother; weight and size should not exceed 20 lb. and 14 ins. respectively, compared with 45 lb. and 20 to 21 ins. for the full size bull terrier.

Bull Trout. Name which was at one time supposed to differentiate a definite race of sea trout, but which seems in fact to have been applied merely to particularly large specimens of at least three different fish found in the British Isles: the grey trout (or round tail), the brown trout, and in some districts the salmon as well. The term is no longer much used.

Bülow, BERNHARD HEINRICH MARTIN KARL, PRINCE VON (1849-1929). German statesman. Born at Klein-Flottbeck, Holstein, May 3, 1849, and educated at the universities of Lausanne, Leipzig, and Berlin, he volunteered for service in the army during the Franco-

Prussian War, 1870-71. He joined the diplomatic service in 1873, served as junior secretary in the embassies at St. Petersburg and in 1877 at Vienna. He was also one of the officials of the Congress of Berlin in 1878.

Bülow was first secretary at Paris, 1878-84, at St. Petersburg, 1884-88, minister at Bukarest, 1888-93, and ambassador at Rome, 1893-97. From 1897 he was foreign secretary until in 1900 appointed chancellor and president of Prussia in succession to Prince Hohenlohe. He was made a prince of the German Empire in 1905, and retired from the chancellorship in 1909. In 1914 he was sent to Rome as ambassador, but failed in his efforts to prevent the entry of Italy into the First Great War. His *Imperial Germany*, Eng. trans. 1914, rev. ed. 1916, is a defence of the policy of Germany, and contains his theories of autocratic rule. Living in Rome, he produced a huge autobiography, 1925-30. He died Oct. 28, 1929.

Bülow, FRIEDRICH WILHELM, BARON VON (1755-1816). Prussian soldier. He took a prominent part in the War of Liberation against the French, whom he defeated at Grossbeeren and Dennewitz in 1813. He was conspicuous also at Leipzig in 1813, and his forces were the first section of Blücher's army to join Wellington at Waterloo, in 1815. He died at Königsberg, Feb. 25, 1816.

Bülow, HANS GUIDO VON (1830-94). German pianist and conductor. Born at Dresden, Jan. 8, 1830, he read law at Leipzig, but turned his attention to music and studied under Wagner at Zürich and under Liszt at Weimar. In 1853 he began a series of concert tours which made him famous as a pianist throughout Europe and N. America. He was teacher of music at Berlin 1855-64, conductor of the royal opera in Munich 1864-69, and director of music to the duke of Meiningen 1880-85. From 1886 until his death at Cairo, Feb. 12, 1894, he was director of music at Hamburg. He edited *Die Neue Zeitschrift für Musik*, was one of the first musicians to acclaim Wagner's genius, and was an authority on Beethoven. His first wife was Cosima Liszt, who left him for Wagner; his second

wife was Marie Schanzer, the actress. (*Consult Letters*, ed. Scott Goddard, 1931.)

Bulrush (*Schoenoplectus lucustris*). Perennial sedge of the family Cyperaceae. Of world-wide distribution, it is a tall marsh or water plant, with creeping rhizome and leafless or almost leafless stems up to 8 ft. long and nearly 1 in. thick. The leaves cover the base of the stem. In still water they are short and keeled at the back; in streams much longer and strap-like. At the summit of the stem is a pair of leafy bracts from which a number of branches arise, each ending in clusters of red-brown flowers. The spongy stems are used to make chair-seats, mats, and baskets. The reed-mace is sometimes called a bulrush.

Bulsar. Town of Bombay, India, in the Surat district. It is a port on the estuary of the Auranga, 115 m. by rly. N. of Bombay, and is suitably placed for trade by both sea and land. It exports timber, grain, and vegetable oil, makes cloth, silk, and pottery, and has light engineering works. Pop. (1951) 25,440.

Bumble. Character in Dickens's novel, *Oliver Twist*. A pompous parish beadle, he is deprived of his position, and forced to take refuge with his wife in the workhouse in which they had tyrannised over others. The word bumbledom has become a synonym for inept parochial government. *See* Beadle.

Bumble Bee. Large bee of the genus *Bombus*. *See* Humble Bee.

Bumboat. Broad, flat boat used for selling small wares to ships lying in roadsteads or harbours.

Bumping Race. Boat race in which the boats are rowed one behind the other, the aim of each being to touch or bump the one just in front. *See* *Eight's Week*; *Lent Races*; *May Week*; *Torpids*.

Buna. Name formed from first syllables of *butadiene* and *natrium* (sodium) and given to a kind of synthetic rubber originally made from these substances. Sodium is no longer used, but the name is retained for artificial rubbers of the type, generally with the addition of some symbol indicating the exact composition. Buna is now made from limestone and coal pulverised and

then heated in high-temperature furnaces until they combine to form calcium carbide. Treating the carbide with water yields acetylene gas; the acetylene produces a thin liquid which, mixed with hydrochloric acid, becomes clear, and upon exposure to the atmosphere turns into a yellow plastic with properties closely resembling those of raw rubber. Buna was developed in Germany as a substitute for plantation rubber in 1935. It does not deteriorate from age or oxidation, is highly resistant to heat and oil; and is considerably lighter than real rubber. Buna's disadvantages are its exceedingly high cost; the fact that it can be vulcanised only with great difficulty; and its lack of resistance to friction. *See* Rubber: Synthetic Rubber.

Bunbury. Seaport and mun. town of W. Australia. Picturesquely placed on Koombanah Bay, 112 m. by rly. S. of Perth, it is a popular summer resort, and exports coal, tin, timber, and agricultural produce. Fish and birds, notably black swan, abound. Pop. (1954) 9,888.

Bunbury, SIR HENRY EDWARD (1778-1860). British soldier. Born April 4, 1778, son of the caricaturist, Henry William Bunbury, and educated at Westminster, he entered the army in 1795, was chief of the staff at the battle of Maida, Calabria, in 1806, and during 1809-16 under-secretary of state for war. Knighted in 1815, he was appointed to convey to Napoleon the news of his banishment to St. Helena. Whig M.P. for Derby, 1830-31, in his latter years he wrote on historical subjects, and became a pioneer of the volunteer movement. He died April 13, 1860. His uncle, Sir Thomas Charles Bunbury, whom he succeeded as 7th baronet in 1820, won the first Derby in 1780 with his chestnut colt Diomed.

Bunbury, HENRY WILLIAM (1750-1811). British caricaturist. The son of Sir William Bunbury



Henry W. Bunbury.
British artist
Painting by Lawrence

of Mildenhall, Suffolk, he was educated at Westminster and S. Catharine's Hall, Cambridge, and became equerry to the duke of York. His humorous drawings soon attracted popular attention, especially the *Hints to Bad Horsemen*. He died at Keswick, May, 1811.

Bunche, RALPH JOHNSON (b. 1904). American political scientist and administrator. Born at

Detroit, Aug. 7, 1904, the son of a Negro barber, and educated at the university of California and Harvard, Bunche was assistant in the political science dept.



R. J. Bunche, American administrator

of the univ. of Calif. 1925-27, becoming instructor in the same subject at Howard univ., Washington, D.C., 1928, where he was made professor in 1938 after travel in French West Africa and a period of study during 1936-37 at the London School of Economics. In the Second Great War, he entered the office of strategic services, 1941, being head of the Africa section 1943-44, when he went to the dept. of State.

He was appointed director of the U.N. division of trusteeship in 1946, his service there being interrupted 1948-49 when he served first under the U.N. Palestine mediator Count Bernadotte, then, after Bernadotte's assassination, Sept. 17, 1948, as acting mediator in Palestine. Under his skilful handling, armistices were concluded between Israel and her Arab neighbours. For this work, Bunche was in 1950 awarded the Nobel peace prize. In the same year he became professor of government at Harvard.

Buncrana. Urb. dist., market town and resort of co. Donegal, Irish republic. It is on Lough Swilly, 11 m. by rly. N.W. of Londonderry. It has a fine bathing beach, golf links, and remains of an ancient castle. Salmon and sea fisheries are important industries, and trade is carried on in linen and farm produce. Pop. (1951) 3,045.

Bund. German word, meaning a federation or union of states. The first bund of importance was the federation of the German states established in 1815. It included both Austria and Prussia, and lasted until the war between these two Powers in 1866. After this the states of N. Germany, under the headship of Prussia, formed a new bund, the North German Confederation, but this functioned only until 1870. The German-American Bund was a movement of Nazi sympathisers in the U.S.A., some of whom were arrested in 1940. See Germans Abroad.

Bundaberg. River port and mun. town of Cook co., Queensland, Australia. Situated 10 m. from the mouth of the Burnett river, 217 m. by rly. N. of Brisbane, it is the centre of an important sugar-growing dist., and exports sugar, treacle, and timber. Other industries are brickmaking, brewing, and distilling. Pop. (1954) 19,980.

Bundelkhand. Region of central India, an administrative division of Madhya Union, comprising 4 districts. Area 8,859 sq. m. Lying between the Jumna and the Chambal rivers, it is a fertile region of low hills and level plains; it has iron, copper, and diamond mines. Pop. (1951) 1,270,322.

The former Bundelkhand Agency, which absorbed the Baghelkhand Agency in 1931, was divided, 1948-50, between Uttar Union and Vindhya Union (itself absorbed in Madhya Union 1956). The Bundelas, the former rulers, began to acquire power in the 14th century, but came into conflict with the Moghuls and eventually accepted service under them. In 1729 they enlisted Mahratta aid in rejecting Moghul rule. In 1802 the territory was ceded to the British, but the area was a source of disaffection until 1886 when British Bundelkhand, area 11,600 sq. m., was established. It comprised more than 30 states; the h.q. was at Nowgong.

Bundi. District and town and former state of India. The state, area 2,205 sq. m., was incorporated 1948 in Rajasthan. It lay N.W. of the Chambal river.

The Bundi range, a double line of hills, runs S.W.-N.E. across the district, forming an almost impenetrable barrier pierced by four passes. District area 2,139 sq. m. Pop. (1951) 280,518.

The town is picturesquely situated in a striking gorge, surrounded by forts. Immediately to the E. is a great cliff, alt. 1,426 ft., with a small mosque at the summit. Pop. (1951) 22,697.

Bungalow (Hind. *bangalah*, belonging to Bengal). Originally the name for the one-storeyed, verandahed house in use by European residents in India. In Great Britain the word means, strictly, a dwelling-house planned entirely on the ground floor; but by an extension of its meaning such a dwelling-house which also has additional rooms in the roof space is called a bungalow, or sometimes a semi-bungalow. As a permanent dwelling a bungalow is hardly less expensive to construct than a two-storey house of equivalent accom-

modation and having the same amenities, since the larger area covered, and certain increased expenses in connexion with the roof structure, generally outweigh such savings as the omission of a staircase and the lesser height of the walls.

On the score of convenience and general efficiency, the absence of a staircase has its advantages, but here again there are such considerations as the comparative lack of privacy and the "airlessness" of ground-floor bedrooms which may offset other advantages. Broadly speaking, a satisfactory bungalow demands much skill in its planning, plus a spaciousness of site, if it is to be free from some of the objections commonly made to this type of dwelling. Owing to the creation of many thousands of lightly constructed box-like buildings of one storey—huddled together in too close proximity, or dotted about in planless confusion—during the years 1920-30, the bungalow got a bad name; but it has its place in both permanent and semi-permanent schemes, and when designed by a qualified man to suit the site even the temporary dwellings may well satisfy both aesthetic and utilitarian needs. See House.

Bungay. Urban district and market town of Suffolk, England. On the Waveney, 7 m. W. of Beccles, it is served by rly. The town is neat and well built. Holy Trinity Church, Norman in style, has a round tower and contains numerous ancient relics. The grammar school was founded late in the 16th century, and the market place contains an ancient octagonal cross. There was a considerable transit trade by means of the Waveney, but this has lapsed. The river, here spanned by two bridges, communicates with Norwich, Beccles, Yarmouth, and Lowestoft. The town was largely reduced by fire in 1688, but traces remain of the ancient castle of the Bigods, earls of Norfolk. The land was granted by William I in 1075 to Roger Bigod, who came over from Normandy in 1066. Bungay has large printing works and flour mills, and an annual race meeting. Market day, Thurs. Pop. (1951) 3,531.

Bunhill Fields. Public garden and old cemetery in the Finsbury district of London. The earliest mention of Bunhill occurs in 1661, when the field was let by the City Corporation to a man named Tindal, who made a cemetery of

it; but it seems to have been identical with Bone Hill, where malefactors were buried in the reign of Elizabeth I.

Bunin, IVAN ALEXEYEVICH (1870-1953). Russian poet. Born at Voronezh, Oct. 22, 1870, he was educated at the gymnasium at Elets, and at 19 became a local government clerk, working in turn at Kharkov, Orel, and Poltava. He published a first volume of verse at 21, and became known for his translations of Byron, Tennyson, and Longfellow, winning the Pushkin prize with a translation of *Hiawatha*. He travelled in the Balkans, the Levant, Egypt, N. Africa, and Ceylon, and spent the winters of 1911-14 in Capri with Gorky. He published several novels, some of which appeared in Eng. trans., e.g. the first part of the autobiographical life of Arseniev, trans. as *The Well of Days*, 1933. An English translation of his reminiscences, *Memories and Portraits*, appeared in 1951. He received the Nobel prize for literature in 1933. From 1919 he lived in Paris, where he died Nov. 7, 1953.

Bunion (Ital. *bugnone*, projection). Swelling over the head of the first metatarsal bone of the great toe. It is generally caused by wearing too short a shoe with too high a heel. An inflamed bunion causes acute pain, and may become the seat of suppuration. Treatment is to remove all pressure from the area, and to apply hot fomentations, with iodised ointment. It is useless to place pads of cotton-wool between the toes, as the powerful muscles of the great toe ignore them. In severe cases surgical removal of part of the joint is completely successful.

Bunker. Receptacle for containing materials such as coal and ore. The spaces below deck for the storage of coal-fired steamships are called bunkers. Bunkers may be of almost any shape and size, and are usually constructed of timber, steel, or reinforced concrete. A hopper bunker is one which at its lower extremity is fitted with doors which may be opened to discharge contents into wagons etc.

The following is a brief description of a steel suspension hopper bunker 200 ft. long, designed to contain 10,000 tons of coal. The supports consist of two rows of steel stanchions supporting plate girders, from which the bunker plating depends. In cross section the latter approximates to a parabolic curve, so that when the

bunker is full all the bunker plating is in tension, and hangs from the top girders. The ends consist of vertical plating stiffened by horizontal girders. Coal is deposited by means of grabs or buckets travelling on an overhead transporter. Along the bottom, midway between the two rows of stanchions, hopper doors are provided at intervals of 10 ft., under which two railway tracks are laid. A line of wagons is shunted in position under the hoppers, the doors are opened, and coal is discharged until the wagons are full. In some bunkers automatic weighing scales are provided for checking the material delivered.

Bunker. Deep narrow trench with a cover of earth supported on branches or planks and used by troops in action as individual protection against bombing and shell-fire. A more elaborate type of bunker was built of reinforced concrete to serve as an air-raid shelter. During the Russian attack on Berlin in 1945, Hitler sheltered in a concrete bunker in the grounds of the chancellery.

Bunker Hill, BATTLE OF. First big battle in the American War of Independence, fought June 17, 1775. Bunker Hill and Breed's Hill are in Charlestown (now part of Boston), commanding Boston proper, which the English leader, General Gage, desired to secure. Since the encounter at Lexington (*q.v.*) in April, Gage had remained in Charlestown awaiting reinforcements from England. On the night of June 16 a party of American militia about 1,200 strong forestalled his intention of moving against Boston by seizing Breed's Hill, which they mistook for the higher elevation of the two.

This hill the Americans hastily fortified, and behind their works they were able to ignore the fire from the British warships in the harbour. General Gage thereupon ordered a body of infantry, about 2,000 strong, to advance up the hill, in order to drive away the foe. They had almost reached the American position when their ranks were thinned by a steady fire. They re-formed, however, but a second assault was equally unavailing. A third attack was then arranged, and this, being more skilfully conducted, ended in the defeat of the Americans, who, their ammunition exhausted, were forced to retreat, which they did in good order. The English lost 226 killed and 828 wounded and missing. The losses of the colonists were about 450 killed and wounded.

The battle was actually fought on Breed's Hill, but is always called Bunker Hill. See American Independence, War of.

Bunkum OR BUNCOMBE. American term introduced into British politics to denote disingenuous oratory or action dictated solely by a desire for popularity; hence, specious trickery, or humbug generally. It originated in the debate which resulted in the Missouri Compromise, when Felix Walker, whose district included Buncombe county, N. Carolina, insisted on making a long and irrelevant speech on the plea that the electors of his district would be disappointed if he did not "make a speech for Buncombe."

Bunn, ALFRED (1796-1860). British theatrical manager. Known as "the poet Bunn," although his name was a by-word for insolence, ignorance, and vulgarity, he was manager of Drury Lane during 1833-48. He was continuously quarrelling with his actors, and Macready assaulted him in his own room. He produced the principal operas of Balfe, the libretti of which he himself translated. In *The Stage Before and Behind the Curtain*, 1840, he describes his experiences, but the best account is in W. G. Macready's *Diaries*, ed. W. Toynbee, 1912. Bunn died at Boulogne, Dec. 20, 1860.

Bunny, JOHN (1863-1915). U.S. film actor. After some years in comic opera and on the music hall stage he became famous as one of the earliest stars of the screen. His enormous girth and infectious geniality were the mainstay of many early film comedies, usually farces of suburban misadventure, in many of which he was partnered by Flora Finch, a comic actress as thin and angular in figure as Bunny was fat. He also appeared with some artistic success as Pickwick in some early short films based on extracts from Dickens's book. He died April 26, 1915.

Bunsen, CHRISTIAN KARL JOSIAS, BARON VON (1791-1860). German diplomatist and scholar. Born at Korbach in Waldeck, Aug. 25, 1791, he studied at the universities of Marburg, Göttingen, Munich, and Copenhagen. He was secretary to the Prussian embassy at Rome, 1818-24, and ambassador at Rome 1824-38. After two years at Berne he became Prussian ambassador to Great Britain, and resided in London 1841-54, being created a baron on his retirement. He died at Bonn, Nov. 28, 1860.

He failed to persuade Frederick William of Prussia to displace the

emperor of Austria as head of the German confederation, and urged the king to join France and Britain against Russia in the Crimean War. On Prussia remaining neutral in 1854, Bunsen's resignation was accepted. His writings include *Hippolytus and His Age*, Eng. trans. 1852; *Outlines of the Philosophy of Universal History*, Eng. trans. 1854; and a number of books on Evangelical religion.

Of his five sons three held official appointments in Germany, while Henry (1818-55) became a Church of England clergyman, and Ernest (1819-1903) wrote on comparative religion. A grandson, Maurice de Bunsen (1852-1932), who was ambassador at Madrid during 1906-13, and at Vienna during 1913-14, was knighted 1905, and made a baronet on retiring, 1919.

Bunsen, ROBERT WILHELM EBERHARD (1811-99). German chemist. Born at Göttingen,



Robert W. Bunsen,
German chemist

March 31, 1811, and educated at Göttingen University, he succeeded Wöhler in 1836 as professor of chemistry in the Polytechnic School, Cassel. In 1852 he took the professorship of chemistry at Heidelberg, remaining there until his death, Aug. 16, 1899.

His investigation of the properties of the cacodyl series of arsenic compounds nearly cost him his life. He discovered caesium and rubidium, and devised a method of separating yttrium and erbium. With Kirchhoff he discovered the method of spectrum analysis. His name is also connected with the Bunsen cell and Bunsen burner.

Bunsen Burner. Burner for coal gas, invented by R. W. Bunsen. Atmospheric air is admitted by apertures at the base of the burner tube, the gas being introduced by a smaller tube concentric with the outer one. The incoming gas entrains air which mixes with the gas, and the mixture burns at the top of the large tube with a very hot, non-luminous flame. A regulating sleeve fitting loosely on the outer tube enables the air-holes to be closed more or less, to regulate the amount of air which enters. The bunsen burner is used as a convenient source of heat in chemical laboratories, workshops, and the like. The principle was

applied to the incandescent gas mantle-burner for lighting, and is an integral feature of gas boiling burners, cooking appliances, etc.

Bunsen Cell. Two-fluid primary cell consisting of a carbon rod in a porous pot which is surrounded by a cylinder of zinc, the whole contained in a jar. The porous pot contains strong nitric acid and the outer jar dilute sulphuric acid. The Bunsen cell, invented by R. W. Bunsen, gives an e.m.f. of nearly 2 volts; it is no longer much used.

Bunt OR STINKING SMUT (*Tilletia caries*). Fungoid pest of wheat, spread by microscopic spores. Dusting the seed corn with organo-mercury dressings is a preventive.

Bunter, BILLY. Fictitious character in a series of popular stories for boys written by "Frank Richards" (Charles Hamilton, b. 1875) and published weekly in the Magnet library during 1908-1939), later in occasional separate publications. Bunter, grossly fat, spectacled, greedy, and mean, is the perpetual butt of the other boys at Greyfriars school, a figure of derisive fun, remembered with affection by countless readers long since grown to manhood.

Bunter Beds. Red sandstones and pebble beds of from 1,000 ft. to 3,000 ft. in thickness. They form the lower portion of the Triassic rocks of Great Britain, and occupy considerable areas in Devon, Lancashire, and the Midlands, being one of the chief water-bearing deposits from which many large Midland towns obtain their supply of water. In Devon the Bunter beds contain the Budleigh Salterton pebble bed; in the Midlands they consist of a mottled sandstone layer above and below a central pebble bed.

Bunting (*Emberiza*). The name given to a number of small birds allied to the finches. Among them are the reed bunting, yellow-hammer, and ortolan. The Lapland bunting and snow bunting belong to other genera.

Bunting. Light durable woollen fabric used for making flags; also a flag or flags, especially ships' flags. In the British navy the regulation width of bunting is 9 in. The word may come from High German *bunt*, variegated, or from an old word *bunt*, to sift, the terms *bunt* and *bunting* being used locally in Great Britain by flour millers for the process of bolting or sifting meal, and the cloth used for sifting.

Bunting, JABEZ (1779-1858). One of the founders of Methodism. Born at Manchester, May 13, 1779,

he became a Methodist preacher when nineteen years old. It was largely due to him that, after the death of Wesley, Methodism established itself as a separate body in England. He was president of the conference in 1820, 1828, 1836, and 1844, secretary of the Wesleyan Missionary Society for twenty years, and president of the college for training ministers. He died in London, June 16, 1858. Consult Life, T. P. Bunting, 1859.

Bunting, SIR PERCY WILLIAM (1836-1911). British social reformer. Grandson of Dr. Jabez Bunting, he was born at Ratcliffe, near Manchester, Feb. 1, 1836, educated at Owens College, Manchester, and Pembroke College, Cambridge, and was called to the bar in 1862. He edited *The Methodist Times*, 1902-7; *The Contemporary Review*, 1882-1911; and helped to found the National Vigilance Association, Leys School, Cambridge, West London Mission, and National Free Church Council. He was knighted in 1908 and died on July 22, 1911.

Buntingford. Town of Hertfordshire, England. It stands on the Rib, 17 m. N. of Hertford, on the railway. Malting and the manufacture of leather are carried on. Pop. (1951) 1,452.

Bunyan, JOHN (1628-88). English author and preacher. Born at Elstow, Bedfordshire, where his family had long resided, he was baptized Nov. 30, 1628. He attended the parish school, worked at his father's trade as a tinker, and took part in the Civil War, 1644-45, serving probably in the Parliamentary army. In 1648 he married. His wife's dowry consisted of two books, *The Plain Man's Pathway to Heaven*, and *The Practice of Piety*, the reading of which contributed to his conversion a few years later. He not only cured himself of profane language—apparently his worst failing—but with puritan fervour abandoned dancing and bell-ringing, to which he had been addicted.

Joining a nonconformist denomination in Bedford, 1653, he became a recognized preacher, 1657, and was convicted in 1660 under the law that forbade unauthorised preaching. As he steadily refused



John Bunyan,
English author
From an old print

to renounce the right to preach he spent the next twelve years in Bedford county gaol. For the first five years he was allowed considerable liberty. The remaining years were mainly spent in reading, writing, and making tagged thread laces, by the sale of which he helped to support his second wife and children. In gaol he closely studied the Bible and Foxe's Book of Martyrs, and wrote *Grace Abounding to the Chief of Sinners*, 1666, and other works. He was released under the Declaration of Indulgence in 1672, when he became pastor of a new meeting-house in Bedford.

Bunyan underwent a second imprisonment probably in 1677, and it was during this that he began *The Pilgrim's Progress*. The rest of his life was devoted to preaching, writing (his books number about sixty), and religious controversy. Returning from Reading, whither he had gone to plead the cause of a son with an angry father, he caught a chill while riding through a storm, and died Aug. 31, 1688, in the house of a friend at Snow Hill, London. He was buried in Bunhill Fields. A statue and other memorials of him are at Bedford, and in 1912 a Bunyan window was dedicated to his memory in Westminster Abbey.

Of his literary works *The Pilgrim's Progress* is immeasurably the greatest. It is an English classic, written in admirably clear prose, and a model for all who would have a command of the language. Part I appeared in 1678; II, 1684. Within ten years 100,000 copies of the work had been distributed; its subsequent circulation has probably been second only to that of the Bible. Of his numerous other works, three are outstanding: *The Holy War*, 1682, an allegory of the struggle between sin and religion; *The Life and Death of Mr. Badman*, 1680; and the autobiographical *Grace Abounding*, 1666.

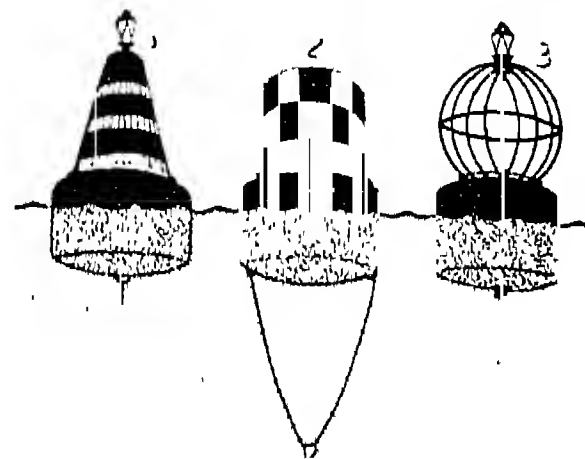
Bibliography. *Life and Times*, John Brown, 1930; J.B., *Mechanick Preacher*, W. Y. Tindall, 1935; J.B., *Maker of Myths*, J. Lindsay, 1937; *Bunyan Calling: A Voice from the 17th Century*, M. P. Willcocks, 1943.

Bunzlau (Pol. Boleslawice). Town of Silesia, placed under Polish administration in 1945. On the Bober, 27 m. by rly. W. of Liegnitz (Legnica), it lies in a district where copper, quartzite, fire-clay, and marble are worked, and manufactures cement. The town was devastated in the Second Great War, its pop. declining from 22,455 (1939) to 3,145 (1946).

Buoy. Floating object moored to a sea, river, or harbour bed as an aid to navigation. Buoys are used to mark channels or fairways and to indicate the position of something beneath the surface of the water such as a shoal, reef, wreck, or a fixed anchorage. Although primitive types, often merely floating blocks of wood, were used from the earliest times as an aid to navigation, the first serious effort to mark a river was not made until 1538, when buoys were anchored in the Thames as warnings to pilots. By the end of the century most harbour and river authorities in England had adopted some system of buoying, and many coastal dangers to shipping had been marked by buoys. These authorities, however, employed types and colours individual to themselves, and there was no uniformity in buoying until 1883, when a conference of nautical authorities in Great Britain decided to adopt a uniform system. Ultimately Trinity House (*q.v.*) was by Act of Parliament made responsible for the upkeep and administration of all navigational buoys in England and Wales and given certain statutory jurisdiction regarding buoys in Scotland, Ireland, the Channel Islands, and Gibraltar.

The channel or fairway into a port or river is generally marked by a double line of buoys. Those on the starboard on entering are always conical in shape, though the sides may be either straight or rounded, and are painted one colour, either red or black. Those

on the port side are flat-topped and known as can buoys. They are painted in either red and white or black and white chequer, or, occasionally, in vertical stripes. Dangers and obstructions in mid-channel are marked by spherical buoys painted with rings and stripes, and carrying a pole with a mark on top: a diamond if the

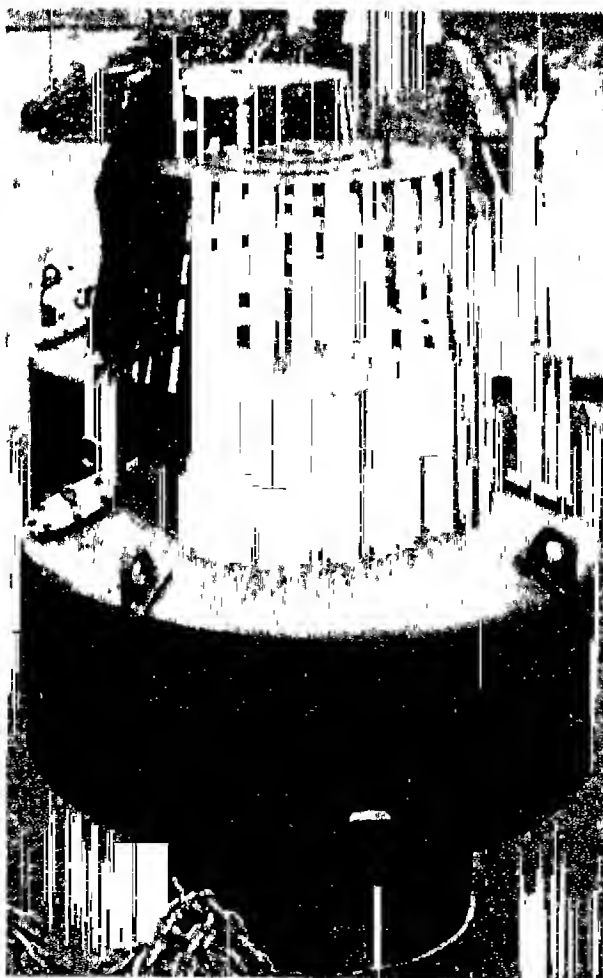


Buoy. Three shapes. 1. Cone, for starboard side of a channel. 2. Can, for port side. 3. Spherical, indicating danger in mid-channel

obstruction is in the outer channel, a triangle if in the inner channel.

The position of a wreck is indicated by a green buoy with the word *Wreck* painted on it. The same colour is used for buoys marking the end of telegraph cables, the word *Telegraph* being painted on them. Buoys employed by the Admiralty for marking the limits of minefields are painted in green and white horizontal stripes. Boom-defence buoys are spherical in shape, weigh 5 cwt., and are painted black.

Various types of buoys are used to mark reefs and shoals off the coast or in river estuaries and harbour entrances. Many of these are fitted with lights, bells, or whistles to give warning at night or in fog. A bell-buoy is in the shape of a half-sphere and about 8 ft. in diameter. The bell is fixed in an iron or steel framework and struck by clappers. The Courtenay whistling buoy consists of a steel cone surmounted by a large deep-toned whistle. A tube projects into the sea to a depth of 30 ft., where the water is not much affected by surface undulation; the column of water in the tube acts like a piston and compresses the air which passes through valves into a smaller pipe where it impinges on the edge of the whistle. Buoys lighted by compressed gas were first used on the



Buoy. Painting a cone buoy for use in the Bristol Channel

Clyde in 1880. The lamp is made to flash or occult by means of a valve worked by the flow of gas.

A recent development is the radio beacon buoy for direction finding. This is fitted with a short-wave radio transmitter which automatically broadcasts specific signals on predetermined wavelengths. (See Direction Finding.) Navigational buoys are usually held in position by a mooring chain attached to a flat iron sinker; occasionally by mushroom anchors. There are over 1,000 navigational buoys round the coast of Great Britain. In wartime they come under the control of the Admiralty, though Trinity House is responsible for upkeep.

Mooring buoys, attached to heavy sinkers, are provided for ships awaiting berths or loading and discharging from lighters. They are usually spherical in shape and surmounted by an iron ring, to which the ship's mooring cable is made fast. Anchor buoys are much smaller and filled with cork. They are attached to an anchor before it is released from a ship, and warn other ships from casting anchor in such a spot that cables might become entangled.

A Dan buoy is used by deep-sea fishermen to mark the position of trawls which may break adrift. Small disk buoys of cork are employed by lobster fishermen to indicate the position of their pots. A nun buoy is placed to mark a spot where underwater work is in progress, such as surveying or marine engineering, with divers at work. Mark buoys are carried by cable-repair ships and put down as soon as the vessel reaches the position of a fault in the cable. Yellow buoys show the alighting areas at flying boat stations. Early in the Second Great War the R.A.F. moored rescue buoys at many points round the British coast over which air combats took place with fair regularity. The rescue buoy was boat-shaped and 30 ft. in length; it had a watertight cabin containing a primus stove, food, drinks, first-aid outfit, dry clothing, and signalling apparatus. See Air-Sea Rescue and illus. See also Lifebuoy: Navigation.

Buoyancy. Power of a body to float on the surface of a liquid. The weight of the whole body must be less than the weight of the volume of liquid it can displace when fully immersed. The difference of the weights is called the reserve of buoyancy.

Buran. Strong north-east wind which blows over the steppes of Russia and Central Asia. It occurs most frequently in winter, when it is very cold and raises a cloud of fine dry snow. A very violent buran is called a poorga.

Burao. Township of British Somaliland, East Africa. Situated 90 m. S.S.E. of Berbera, with which it is connected by trunk road, it is the junction of the main routes to the E. and S.E. of the protectorate. A trading and watering centre, it serves a large area to which the nomadic tribes return with their stock during the dry winter season: water is obtained from wells and gravity-fed from a tower. Burao, the administrative h.q. of the dist., has a hospital and boarding school, and a landing-ground for aircraft. Pop. (1955 est.) 10,000.

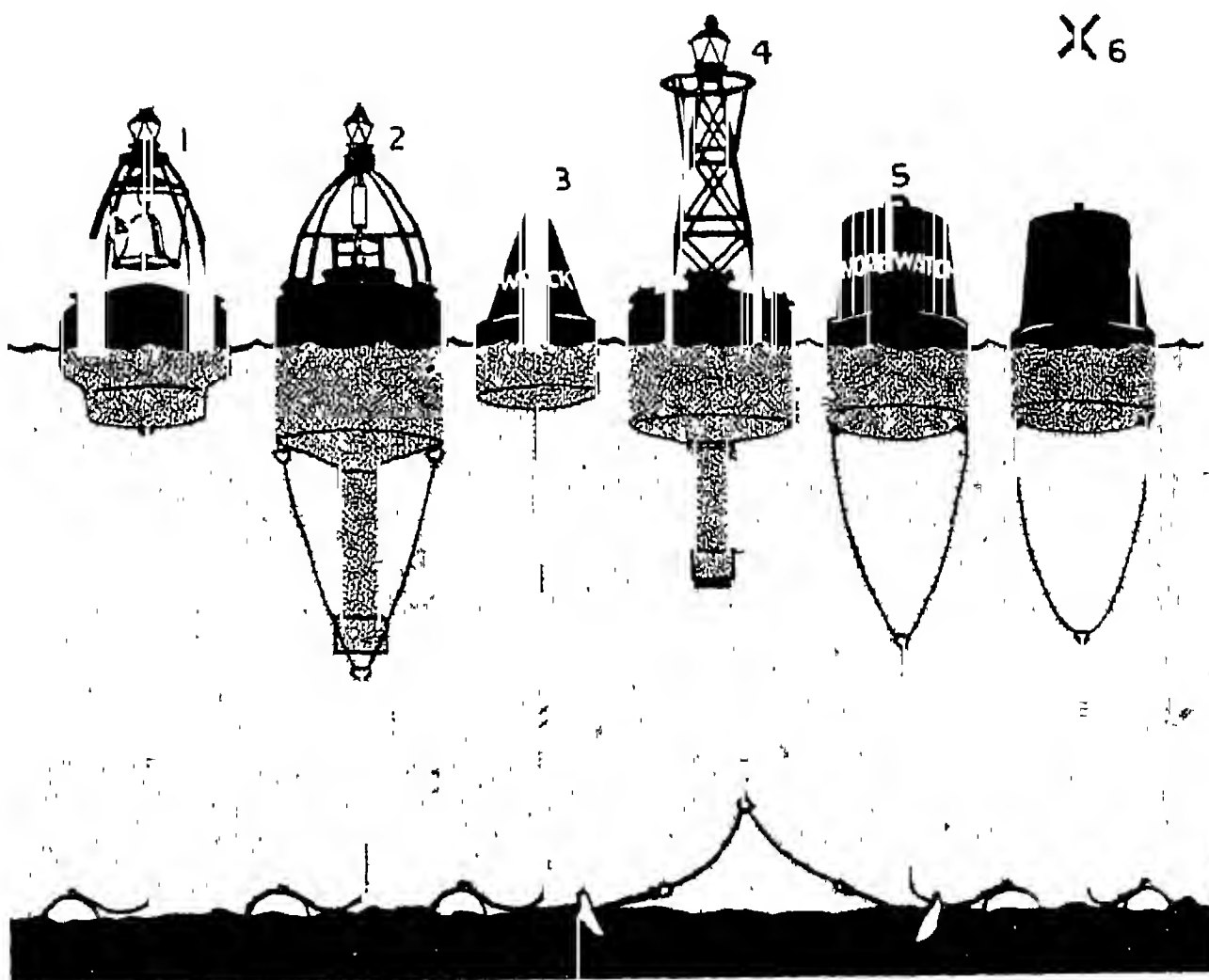
Burbage, JAMES (d. 1597). English actor. He came of a Hertfordshire family, and was a joiner before he went on the stage. His name first occurs as an actor in a patent to the earl of Leicester's players dated May 7, 1574. In 1577, having obtained a 21 years' lease of houses and land between Finsbury Fields and Shoreditch, he built on part of this site the first English theatre, called The Theatre. In 1596 he secured a large house in Blackfriars and converted this into the Blackfriars Theatre. A year after his death the fabric of the Shoreditch theatre was removed to Bankside, Southwark, and re-erected as the Globe.

Burbage, RICHARD (1567-1619). English actor. The son of James Burbage, he made his first appearance at his father's theatre, Shoreditch, as a boy. He joined the earl of Leicester's company of players, later known as the earl of Derby's company, then as the lord chamberlain's company. He created all the greater parts written by contemporary dramatists. The first mention of his association with Shakespeare refers to Christmas, 1594, when he and two other members of his company, William Kempe and William Shakespeare, were summoned to act in two interludes before Queen Elizabeth I at Greenwich Palace on Dec. 27 and 28. He excelled as a tragedian, his greatest Shakespearian characters being Hamlet, Othello, Richard III, and Lear. He also took leading parts in the dramas of Kyd, Marston, Webster, and Ben Jonson. He died March 13, 1619 (N.S.). Burbage also had some reputation as a painter.

Burbank, LUTHER (1849-1926). American market gardener and experimenter in plant breeding by hybridisation and selection who produced the loganberry, the seedless



Richard Burbage,
English actor
Self-portrait in Dulwich
Gallery



Buoy. 1. Bell buoy. 2. Whistling buoy. 3. Buoy indicating the position of a wreck. 4. Light buoy which flashes its warning signal. 5. Watch buoy moored near a lightship. 6. "Nun" buoy indicating that under-water work is in progress

orange, the stoneless plum, and the giant, white, and thornless blackberries. Born March 7, 1849, at Lancaster, Mass., the son of a farmer, he carried out during 1875-93 many thousands of experiments at his nursery at Santa Rosa, California. Of the innumerable new plants he produced he selected for development only those which seemed best to him. Besides the fruits mentioned, he produced the Shasta daisy, a thornless cactus suitable for cattle food, and a much improved potato suited to Massachusetts conditions. He died April 11, 1926. *Consult* Life, H. S. Williams, 1915.

The town of Burbank in California (pop., 1950, 78,577) is named after him.

Burbidge, SIR RICHARD (1847-1917). British business man. Born in Wiltshire in March, 1847, he served an apprenticeship in the grocery trade in London, and in 1866 started business on his own account. He became general manager of William Whiteleys in 1882 and in 1890 managing director of Harrods stores. He sat on government committees during the First Great War, and was chairman of the committee on the Royal Aircraft factory. Created a baronet in 1916, he died in London, May 31, 1917.

His son, Richard Woodman Burbidge (1872-1945), was associated with Harrods from 1893. During the First Great War he was a member of the ministry of Munitions' staff investigation committee, and also helped to provide relief for Rumanian refugees. He succeeded his father as second bt. and became chairman of Harrods in 1921. He died June 3, 1945.

Burbot (*Lota lota*). Fresh-water fish belonging to the cod family. It is often called the eelpout (*q.v.*).

Burchiello (c. 1404-48). Italian satirical poet. Born at Florence, where his barber's shop became a meeting-place for artists and men of letters of the city, he composed numerous burlesque sonnets *alla coda* (with a "tail" or tag of three lines added to the regular 14), written in 15th century Florentine slang. After living in poverty at Siena, he died at Rome. His real name was Domenico di Giovanni.

Bürckel, JOSEF (1895-1945). German administrator. He became known as commissar for the Saar plebiscite which in 1935 returned that province to Germany. His ruthless methods while Gauleiter (governor) there under Hitler recommended him for the task of making Austria a Nazi

state after 1938. He organized the suppression of Socialists and the massacre of Jews. Replaced by von Schirach in 1940, he was transferred to Lorraine as Gauleiter on the fall of France and gained an ugly reputation for deporting workers and finding hostages. He died Sept. 29, 1945.

Burckhardt, JAKOB (1818-97). Swiss art historian. His monumental work *Die Kultur der Renaissance in Italien* (Renaissance civilization in Italy), published in 1860, had a profound influence on historical method. Born at Basel, May 25, 1818, he was professor of history at Basel 1849-93 (with a break of two years at Zürich). His lectures on the philosophy of history (published posthumously in 1905) greatly influenced Nietzsche. *Der Cicerone*, a critical guide to Italian art, appeared in 1855. He died Aug. 8, 1897. His collected works were published in 14 vols., 1929-34. A new ed. of *The Civilization of the Renaissance in Italy* was published in English, 1944; and in 1949 appeared an English translation of his *Die Kultur Zeit Constantins der Grossen* (civilization of the time of Constantine the Great).

Burckhardt, JOHN LEWIS (1784-1817). Swiss traveller, the first European to enter Mecca. Born at Lausanne, he was educated at Leipzig and Göttingen. He came to England in 1806, studied Arabic in London and Cambridge, gained the support of Sir Joseph Banks and others, and in 1809 set out on African exploration. Disguised as an Indian trader, he lived at Aleppo for more than two years, in 1812 crossed into Egypt, explored the Nile valley to the frontiers of Dongola, and reached Suakin in 1814. Passing as a Muslim, he made the pilgrimage to Mecca and visited Medina. He died at Cairo, Oct. 15, 1817, and was buried in the Mahomedan cemetery under his adopted name of Ibrahim ibn Abdallah. He left his collection of 800 oriental MSS. to Cambridge University library. His accounts of his travels were published posthumously.

Burdekin. River of N.E. Queensland, Australia. Rising in Seaview range, it flows past Charters Towers and Ravenswood, and empties into Upstart Bay. It is 440 m. long. Heavy floods in its upper reaches cause untold damage; but its fertile delta area is important to the prosperity of N. Queensland. Works for irrigation, hydro-electric power, and flood mitigation were undertaken in the 1950s.

Burdett, SIR FRANCIS (1770-1844). British politician. Born Jan. 25, 1770, he was educated at Westminster and Oxford. In 1793 he married Sophia, daughter of the banker, Thomas Coutts.

In 1796 he was elected M.P. for Boroughbridge and in 1797 succeeded his grandfather as 5th baronet.

For the next 40 years he was a courageous advocate of parliamentary reform, prison reform, and freedom of speech. Elected M.P. for Middlesex, 1802, after heavy litigation he was declared unseated in 1806. During 1807-37 he was Radical M.P. for Westminster, and during that period was twice imprisoned on political charges. He sat as Conservative M.P. for N. Wilts from 1837 until his death, Jan. 23, 1844. The Baroness Burdett-Coutts (*v.i.*) was his youngest daughter. *Consult* Life and Times, M. W. Patterson, 1931.

Burdett, SIR HENRY CHARLES (1847-1920). British publicist and statistician. Born March 18, 1847, after serving as superintendent of hospitals at Birmingham and Greenwich, he was in 1880-98 secretary of the share and loan department of the Stock Exchange. In that connexion he edited the various volumes known as *Burdett's Official Intelligence of British, American, and Foreign Securities*, but he is better known for his hospital work. He founded and long edited *The Hospital*, had much to do with the inception of various hospital funds, and edited the works of reference known as *Burdett's Hospitals and Charities* and *Burdett's Hospitals and Asylums of the World*. Knighted in 1897, he died April 29, 1920.

Burdett-Coutts, ANGELA GEORGINA BURDETT-COUTTS, BARONESS (1814-1906). British philanthropist.



Baroness Burdett-Coutts. British philanthropist



Sir Francis Burdett, British politician. Painting by Lawrence

She was born April 21, 1814, youngest daughter of Sir Francis Burdett, son-in-law of Thomas Coutts, the banker. In 1837 she inherited practically the whole

of the enormous fortune made by her grandfather the banker, under

the will of the duchess of St. Albans (the popular actress, Harriot Mellon), Thomas Coutts's second wife. Created a peeress in 1871, in 1872 she was the first woman to receive the freedom of the city of London. In 1881 she married William Lehman Ashmead-Bartlett (1851-1921), who took the name of Burdett-Coutts. She died Dec. 30, 1906, and was buried in Westminster Abbey.

She was a generous patron of the arts, and her interest in social, educational, and religious objects was lifelong. She built churches and schools, endowed and founded colonial bishoprics, supported missions, hospitals, homes, and other causes, spent vast sums on improving conditions in E. London, and aroused public attention to the need for more humane treatment of animals. In many of her enterprises she was advised and often privately assisted by Charles Dickens, who was a close friend. *Consult* Life, C. B. Patterson, 1953; Dickens's Letters to Angela Burdett-Coutts, 1841-65, ed. E. Johnston, 1953.

Burdock. Coarse biennial herb (*Arctium lappa*) of the family Compositae. It is a native of Europe and N. and W. Asia. The lower leaves are 1 ft. across, heart-shaped, and densely coated with white cotton-like hairs on the underside. The stem is about 4 ft., with



Burdock or common bur, biennial herb

lance-shaped leaves, and terminates in branches which bear spherical thistle-like flower-heads closely invested with innumerable slender, stiff bracts ending in hooked points. The seeds are dragged off by their hooks catching in the fur of animals or the clothes of man, and are in this way disseminated widely. The young shoots were formerly cooked and eaten for rheumatism. Burdock is cultivated in Japan as a vegetable under the name of gobo, and also used medicinally.

Burdon-Sanderson, Sir John Scott (1828-1905). British physiologist. Born at Jesmond, Newcastle-on-Tyne, Dec. 21, 1828, he graduated M.D. at Edinburgh, and afterwards studied under Claude Bernard in Paris. In 1853 he was appointed registrar and lecturer to St. Mary's Hospital, Paddington, and in 1856 medical officer

to the parish. Made inspector under the privy council, he inaugurated the experimental study of contagious and infectious diseases, cattle plague, tuberculosis, and cerebro-spinal meningitis, and in 1869 proved conclusively the relationship of particular microbes to specific diseases.

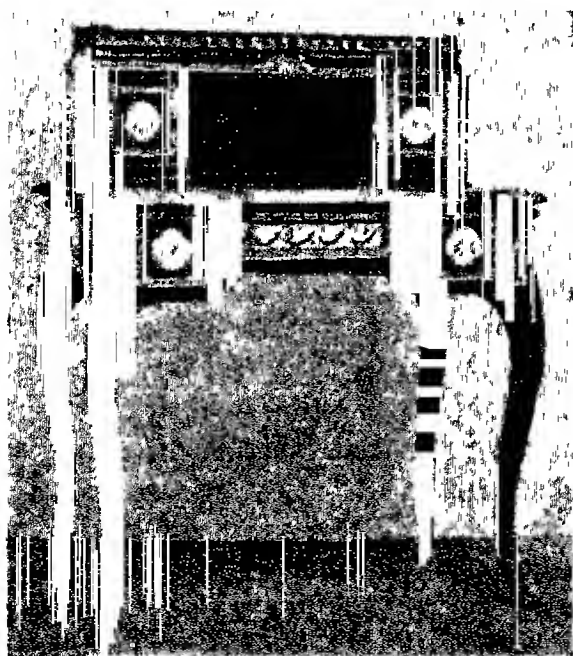
In 1870 he resigned his appointments for scientific research, and for 12 years held professorships of physiology at London university. In 1882 he became the first Waynflete professor of physiology, and between 1895-1903 was regius professor of medicine at Oxford. He insisted that experimental research was necessary in pathology. Croonian lecturer to the Royal Society, 1867, 1877, 1899, president of the British Association, 1893, he was created a baronet in 1899 and died at Oxford, Nov. 23, 1905. *Consult* Memoir, G. Burdon-Sanderson, 1911.

Burdur. Town of Turkey in Asia, capital of a vilayet of the same name. The town lies a few miles from the salt lake, Burdur Göl, and 67 m. N.N.W. of Antalya. It has linen factories and tanneries. Pop. (1950) vilayet, 136,359; town, 14,901.

Burdwan. See Bardwan.

Bure. River of Norfolk, England. Rising near Hindolveston, it flows S.E. and joins the Yare at Yarmouth. It is 50 m. long, and is navigable to Aylsham.

Bureau (Old Fr. *burel*, baize). Form of writing desk, formerly also called a secretary, introduced in the reign of Louis XIV. Bureaux are compound pieces of furniture, the base being a chest of drawers, the middle portion provided with a slanting ledge, hinged at base, and opening out to form a writing desk, revealing a nest of small drawers or niches. Above this a piece is sometimes added, consisting of bookcase or nest of large pigeonholes, enclosed by



Bureau or secretary of marquetry work, French style of Louis XV

glazed or panelled doors. An 18th century example of red lacquer with gold and silver embellishments is in the Victoria and Albert Museum, S. Kensington.

By an association of ideas bureau came to mean an office or department, e.g. a *bureau de change*, and in the United Kingdom of late years there have sprung up labour, information, and other bureaux.

Bureaucracy (Fr. *bureau*, writing desk; Gr. *kratein*, to rule). Political term meaning government by officials. The word and the cognate term bureaucrat, have acquired a somewhat derogatory significance as implying government by officials who have an excessive regard for the importance of their departmental functions, to the prejudice of both state and individual. See Administrative Law.

Bureau of Current Affairs. Name adopted by the former Army Bureau of Current Affairs (q.v.) in 1946, when administration was taken over by the Carnegie Trust.

Burette (French, cruet-bottle). Cylindrical glass tube, of varying diameter, upon which is engraved a scale in cubic centimetres and sub-divisions indicating the fluid contents of the instrument. The top of the burette is preferably finished off like a small funnel, and the lower end is considerably narrowed and fitted with either a glass tap or a short length of rubber tubing upon which presses a brass pinch-cock. The zero of the graduations on the burette is at the upper end, so that when liquid is allowed to escape from the tap or pinch-cock, the amount can be read off on the scale.

The burette is used in the volumetric system of analysis. The liquid in the burette is made to contain a definite amount of a reagent in each cubic centimetre, so that if this is an acid, such as sulphuric acid, and the liquid to be tested is an alkali, it is an easy matter to calculate the amount of alkali present by noting the quantity of acid needed exactly to neutralise the solution.

Burford. Town of Oxfordshire, England. It is on the Windrush, 17 m. W. of Oxford. It has beautiful old houses and

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Burette



Burford. Looking down the main street of this small picturesque town in Oxfordshire

inns and a fine church of S. John the Baptist (Norman, E.E., and Perp.). The grammar school is 16th century. Speaker Lenthall died at Burford Priory in 1662. Pop. (1951) 855. *Consult* Burford, Past and Present, M. S. Gretton, rev. ed., 1945.

Burg. Town of E. Germany, in the Magdeburg district. It is on the river Ihle, 15 m. by rly. N.E. of Magdeburg. From the 12th century it has been noted for clothmaking, an industry fostered in the 17th century by Walloon and other refugees. It manufactures also boots and shoes, gloves, starch, and bricks, and trades in agricultural produce. Pop. (est.) 24,000.

Burgage Tenant. An ancient form of land holding in English boroughs. The return made to the lord was a money payment, not, as with most other tenures, the rendering of services. It was a freehold tenure.

Burgas OR BOURGAS. Port of Bulgaria, capital of a province of the same name. On the Gulf of Burgas, a fiord-like arm of the Black Sea, it lies about 55 m. S.W. of Varna (Stalin), and is the terminus of a rly. connecting it with Sofia on the W. and Edirne on the S.W. It has a commodious harbour with an anchorage in the roadstead of from 4 to 6 fathoms. It exports grain, wool, butter, and agricultural products, and imports raw materials and machinery. Local manufactures include sugar, soap, and textiles; and there are engineering plants, and salt works based on the saline deposits on the shore of the region. Pop. (1946) 43,684.

Burgee. Small flag ending in either a point or a swallow-tail. Each yachting club has its own burgee. The club flag is pointed, but the burgees of the commodore and the vice-commodore are swallow-tailed. Only the Royal Yacht Squadron may fly the white ensign, but some of the other royal clubs,

such as the Royal Thames, have the crown in their burgee. *See* Flag.

B ü r g e r, G O T T F R I E D A U G U S T (1747-94). German poet. Born Dec. 31, 1747, at Molmerswende, near Halberstadt, the son of a Lutheran minister, he was edu-

cated at Halle and at Göttingen. A student of Shakespeare and a member of the Göttingen Hain or poets' union, he edited the organ of that movement, *Der Musenalmanach*, from 1778 until his death at Göttingen, June 8, 1794. In *Der Musenalmanach*, in 1773, his *Lenore* appeared, a ballad translated by Scott into English and by the elder Dumas into French.

Burger, WILLIAM SCHALK (1852-1918). Boer politician and soldier. Born at Lydenburg, E. Transvaal, he entered political life as a member of the Transvaal executive. He was a leader in the South African War of 1899-1902, taking part in the siege of Ladysmith, and was for some time in command of the forces surrounding the town. At the head of his commando he fought at Spion Kop and Paardeplaats. When Kruger fled to Europe, Burger became acting president. He was one of the Boer delegates at the Vereeniging Conference in 1902, when he urged the acceptance of the British terms. He represented the Transvaal in the Senate until his death in Dec., 1918.

Burgers, THOMAS FRANÇOIS (1834-81). President of the Transvaal. Born in Cape Colony, and trained in theology at Utrecht, he was a minister of the Dutch Reformed Church for eight years at Hanover, Cape Colony. Elected president of the Transvaal in 1872, he failed in his plan for a railway from Delagoa Bay to the interior in 1875, and was unsuccessful in his war against Sikukuni, a native chief, in 1876. Owing to the disorderly and insolvent condition of the country he agreed to the annexation of the Transvaal to Great Britain by Sir Theophilus Shepstone

in 1877. He was pensioned by the British government, retiring to Hanover, and died Dec. 9, 1881.

Burges, WILLIAM (1827-81). British architect, a prominent figure in the "Gothic Revival," best remembered for his restorations and adaptations in the medieval style. He was born in London Dec. 2, 1827. S. Finbar's cathedral, Cork, 1863-70, is his principal building; others of note were the cathedral at Brisbane, Queensland, 1859; the speech room at Harrow school, 1877; and his own curious house in Melbury Road, Kensington, where he lived an eccentric life on medieval lines and where he died April 20, 1881. He was also a water-colourist of distinction.

Burgess, THOMAS WILLIAM (1872-1950). British swimmer and the second man to swim the English Channel. Born at Rotherham, Yorks, June 15, 1872, he settled in Paris when a young man and established a successful motor-car tire business there. A keen swimmer, Burgess made 15 attempts to swim the English Channel before succeeding. Entering the water at 11.15 a.m. on Sept. 5, 1911, near Dover, he touched bottom E. of Cape Grisnez at 9.50 next morning. The distance was 39½ m., increased to nearly 60 m. because he drifted with varying currents. Burgess, who married a Frenchwoman, remained in Paris until his death in July, 1950.

Burgess Hill. Urban dist. of Sussex, England. It is 9 m. N. of Brighton, on the electric rly. The church of S. John, built in 1863, is in the Early English style. Chief industries are brick, pottery, and tile making; an annual sheep fair is held. Pop. (1951) 8,524.

Burgh. Scottish equivalent of the English word borough. Royal burghs (70 in 1707) received their charters from a king; burghs of regality and burghs of barony were dependent on some lord, bishop, or baron, although the king had certain rights of jurisdiction or regalities. The royal burghs had greater independence, but today the three classes are usually grouped together, as the difference disappeared with the abolition of hereditary jurisdictions in 1747.

Two newer classes arose after 1832; parliamentary burghs, those which then obtained the right of sending a member to parliament, or of uniting with others to do so; and police burghs, places that have grown in importance since the passing of the Police Act of 1850. They obtained the right to elect



W. Schalk Burger.
Boer politician

a council to look after the drainage, lighting, etc., of their town, including all that is meant in Scotland by the word police. Since the 12th century commissioners from the older burghs have held a yearly convention in Edinburgh, and since 1879 parliamentary burghs have also been represented.

The burghs of Scotland were reformed in 1833, their present method of government being then introduced, but a few alterations were made by later acts. This method includes the election of a corporation to manage the burgh's affairs, consisting of councillors who are elected by the ratepayers and of bailies elected by the councillors. Burghs are "large" (pop. 20,000 or over) or "small."

Burgh, HUBERT DE (d. 1243). Chiefjusticiar of England. He was chamberlain to King John in 1201, and after gallant service in Normandy was on the king's side at Runnymede, and was made one of the conservators of Magna Carta. In the same year, 1215, he was appointed justiciar. He is said to have been for some time custodian of Arthur of Brittany. In 1217 Hubert gained the first notable English victory at sea, destroying the bulk of a French fleet off Dover. Except for the regent, William Marshall, earl of Pembroke, Hubert was the foremost man in England during the minority of Henry III, and for some years after it ended. In 1227 he was created earl of Kent. Later he was involved in strife with many of the nobles and was outlawed by Henry III, 1232, but reconciled to him, 1234. Hubert died May 12, 1243, and was buried in the Blackfriars religious house which he had richly endowed.

Burghers. In general the term burgher was once synonymous with burgess. But, in particular, burghers was the name given to members of the Associate or Burgher Synod in Scotland in the 18th century. Members of this synod of Scottish Presbyterians, though they had seceded from the main body on the question of patronage, still took the burgess oath to maintain the religion authorised by the laws of the realm. To this oath the anti-burghers objected on the ground that, having seceded from the established kirk, they could not consistently regard it as "the true religion" mentioned in the oath. The anti-burghers formed themselves into the general associate synod. Both synods, after being further divided, drew together again, increased in

membership, and became in 1847 the United Presbyterian Church.

Burghersdorp. Town of the Cape of Good Hope province, S. Africa. It is close to Stormberg Spruit, 4,650 ft. high, 39 m. by rly. S.W. of Aliwal North, and near the rly. junction for Bethulie. It is an important market town. Pop. (1951) 6,159.

Burghers of Calais, THE. A group of heroic bronze statuary by Auguste Rodin commissioned by the people of Calais in 1886, and erected in front of the town hall in 1895. It represents the six leading townsmen who yielded the keys to Edward III of England after his siege of 1346-47. Angered by a stout eleven months' resistance, Edward commanded them to appear clad only in their shirts. Froissart tells how they came expecting death, and how Queen Philippa knelt to her husband and persuaded him to spare them. Rodin was asked to provide one figure only, that of the leader Eustache de St. Pierre, but Froissart's story so inspired him that he insisted on producing the complete group for the fee agreed upon for the statue of Eustache.

The six statues are separate, and dispute arose between sculptor and townspeople as to their pedestal and grouping. In 1915 replicas of the set were unveiled in the Victoria Tower Gardens, London, on a plinth 15 ft. high, as specified by Rodin himself; this group was in 1956 moved to a plinth 3 ft. 3 ins. high in a different part of the same garden. The sculptor's first intention had been to place the Calais statues in single file almost at ground level.

Burghley OR BURLEIGH, WILLIAM CECIL, 1ST BARON (1520-98). English statesman, the principal

minister of Elizabeth I. Born at Bourne, Lincolnshire, Sept. 13, 1520, the son of Richard Cecil of Burghley, Northamptonshire, at one time sheriff of Rutland, Wil-



William Cecil,
1st Baron Burghley

liam Cecil was educated at Stamford and Grantham schools, and St. John's College, Cambridge.

In 1548 he entered public life as secretary to the Protector Somerset, and on his master's fall was imprisoned for two months in the Tower of London. A year later he returned to office as secretary of

state, and in 1551 was knighted. During Mary's reign he conformed to Catholicism, and accompanied the mission that brought Cardinal Pole to England as papal legate. In 1553 he had signed the document which nominated Lady Jane Grey as Edward VI's successor, but he claimed to have done so only as a witness. In 1558 he remained out of parliament, and was in communication with the Princess Elizabeth, whose confidence he gained.

On her accession Elizabeth made him her secretary of state, and until his death he remained her most trusted adviser. He shared her conviction that while Philip II of Spain could not afford to force war upon England, war was inevitable, and that the longer it was deferred the better would be England's chance of a decisive victory. England's security lay in national prosperity, assured by sound and popular administration at home, by restoration of financial equilibrium, by maintaining in Scotland the ascendancy of the Protestant party, which would always look to England for support, and by assisting the Protestants of the Netherlands and France, who were antagonistic to Spain.

In England, from 1570, he worked for the extermination of Roman Catholicism. After the defeat of the Armada the policy of Elizabeth and Burghley was directed to humbling rather than crushing the Spanish power, which they wished to retain as a counterpoise to France. At the same time they encouraged raids on Spanish commerce. Cecil never dominated Elizabeth, who went her own way, secure of his loyalty, always confident that her own dexterity would be supported by his solid sagacity.

Created Baron Burghley in 1571, and K.G. in 1572, he was lord high treasurer from 1572 until his death, Aug. 4, 1598. He was buried in Westminster Abbey. He devoted much time and money to beautifying Burghley House; Theobalds, in Hertfordshire, which his son exchanged for Hatfield; and Cecil House, in the Strand. His eldest son, Thomas, was created Earl of Exeter in 1605, and the barony was merged in this title. Another son, Robert, succeeded his father as the queen's chief adviser, and became Earl of Salisbury.

Burghley, DAVID GEORGE BROWNLOW CECIL, LORD (b. 1905). For this British athlete, see Exeter, 6th marquess of.

Burghs, CONVENTION OF. Meeting held every April in Edinburgh of representatives from the royal, parliamentary, and police burghs of Scotland to discuss matters affecting their common interests. It dates from the 12th century, and is believed to have been first summoned by David I (reigned 1124-53). At first it consisted of commissioners or deputies from the four principal towns of Scotland—Edinburgh, Stirling, Berwick, and Roxburgh; the number was later increased until in 1707 it represented 70 burghs. The treaty of Union specifically reserved to the burghs all their rights. *See also under* Burgh.

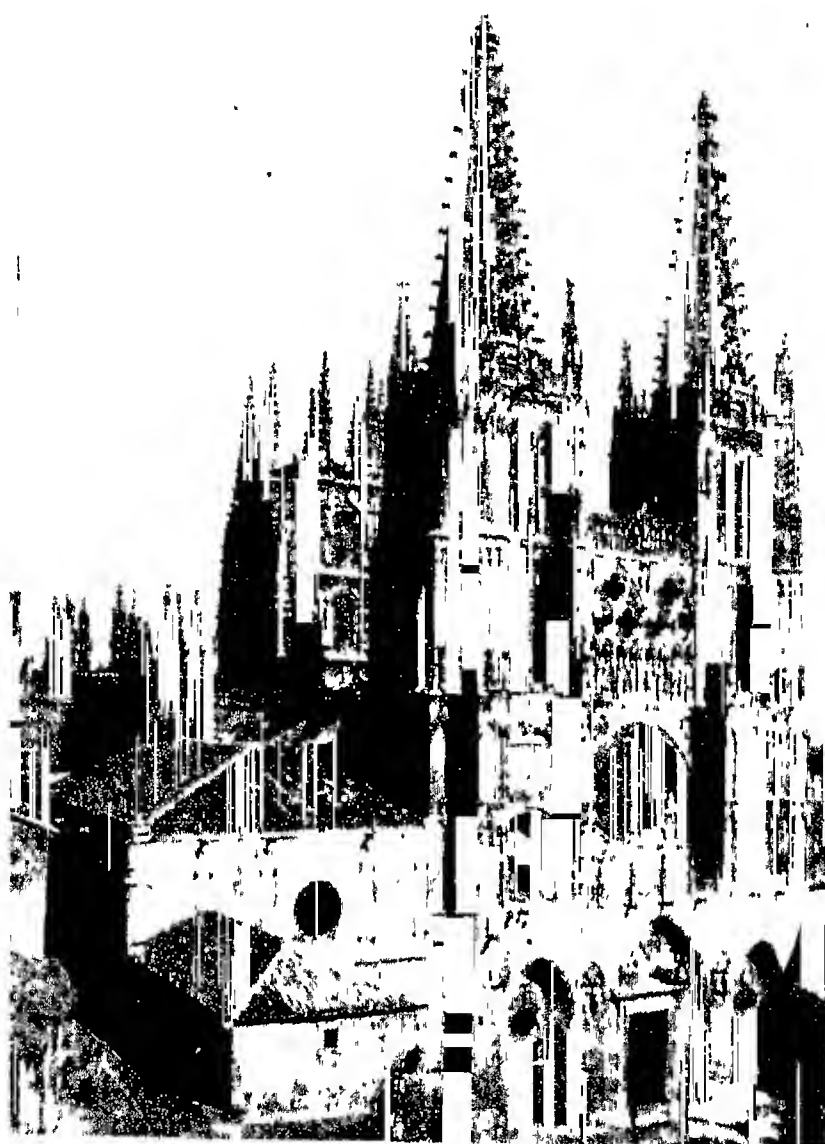
Burgin, GEORGE BROWN (1856-1944). British writer. Born at Croydon, Jan. 15, 1856, he went to Canada as a young man, serving an apprenticeship in journalism in Montreal. After having spent some time in Asia Minor with Baker Pasha (Valentine Baker—*q.v.*), he settled in London and devoted himself to writing. His first book, *His Lordship and Others*, appeared in 1894, and 40 years later he had written over 100. His later works, mostly autobiographical, include *Memoirs of a Clubman*, 1921; *Many Memories*, 1922; *Some More Memories*, 1925. He died June 20, 1944.

Burgkmair OR BURCKMAIR, HANS (1473-1551). German artist best known for his engravings which show the influence of Albrecht Dürer, under whom he studied. Born at Augsburg, he ranks high among European illustrative artists, particularly in the series representing the triumphs of his patron, the emperor Maximilian I. His prints, chiefly executed on wood, were designed with much spirit.

Burglary. In English law, breaking and entering into a dwelling-house between 9 p.m. and 6 a.m., G.M.T., with intent to commit a felony therein; or breaking out of a dwelling-house during those hours after having committed a felony therein or after having entered with intent to commit a felony therein. The maximum punishment is imprisonment for life.

Breaking is an elastic term. It is not only breaking in (or out of) a

dwelling-house, actually to break some part of the house, *e.g.* to break a window pane; but also to lift the latch of a shut door; to push still farther open a window partly open; to be let into a house by a confederate who opens a door or window for the purpose. It is not lawful to kill a burglar, except in self-defence; but it is lawful to protect one's family or property by force, using only such force as is necessary.



Burgos. Façade of the cathedral, which took 300 years to build. The towers were completed in 1458

Burgomaster (Dutch *burgemeester*). Title of the chief magistrate of a Dutch, German, or Belgian town. The office nearly corresponds to that of mayor in England and provost in Scotland, with the difference that the German burgomaster is a paid official.

Burgomaster of Stilemonde, THE. Tragedy by the Belgian playwright Maurice Maeterlinck. Written in 1918, it portrays a small Belgian town at the start of the First Great War. The action concerns the arrest of the burgomaster as a hostage by a German officer long affianced to the burgomaster's daughter.

Burton, JOHN WILLIAM (1813-1888). British divine. Born at Smyrna (Izmir), Aug. 21, 1813, he was educated at Worcester College, Oxford, became fellow of Oriel, and in 1863 vicar of St. Mary's, Oxford. In 1875 he was appointed dean of Chichester, where he died Aug. 4, 1888. Burton published *Lives of Twelve Good Men*, 1888.

Burgos. Province of N. Spain. Mainly mountainous, it is traversed by the Cantabrian Mts. and watered by the Ebro and Douro rivers and their affluents. Its climate is severe and its soil poor, except in the Ebro valley. Gold, silver, copper, lead, coal, salt, sulphate of soda, and china-clay occur. Merino sheep and goats are reared. Area 5,535 sq. m. Pop. (1952) 400,002.

Burgos. City of Spain, capital of the prov. of the same name, and ancient capital of Castile. On the river Arlanzón, 130 m. N. of Madrid (230 m. by the Irun-Paris rly.), it is situated on a bleak hill, 2,785 ft. high, and has a long, cold winter and scorching summer. It is a communications centre, with flour and paper mills, distilleries, and a variety of manufactures including woollen and leather goods, fertilisers, and chocolate; it trades in agricultural produce. Pop. (1952) 74,345.

A city of great historical and architectural interest, it is the seat of an archbishopric; the magnificent Gothic cathedral, begun in 1221 and completed in the 16th century, has many richly sculptured medieval tombs and other treasures. The Cid Campeador, Spain's national hero, who belonged to Burgos, is buried here. In and around the city are many other medieval churches, monasteries, and mansions. The sculptured Arco de Santa Maria was built in honour of Charles V. The castle, now ruined, was the scene of the marriage of Edward I of England and Eleanor of Castile.

Burgos was traditionally founded in 884, and was capital of the united kingdoms of Leon and Castile until superseded by Toledo in 1087. It was sacked by the French in 1808, and four times unsuccessfully besieged by Wellington before he took it in 1813.

Burgoyne, JOHN (1722-92). British soldier, dramatist, and politician, nicknamed "Gentleman

Johnny." Born Feb. 24, 1722, at Sutton Park, Bedfordshire, and educated at Westminster, he entered the army in 1740. During 1758-62 he saw service at

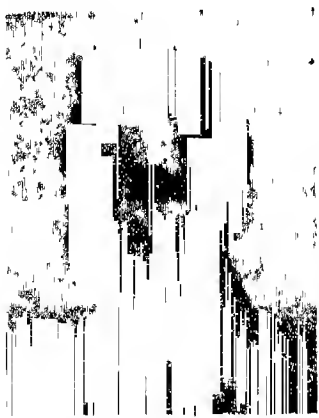


John Burgoyne, British soldier

Cherbourg, at St. Malo, and in Portugal. From 1768 he was M.P. for Preston, and in 1775 his play, *The Maid of the Oaks*, was produced by Garrick at Drury Lane.

In 1777 he was sent to Canada with instructions to join forces with Howe in the state of New York. His army was badly equipped and much under strength, and though he took Ticonderoga he was compelled to surrender with all his force to General Gates at Saratoga. On his return to England he defended himself in Parliament and in a number of pamphlets, went over to the Whigs, and engaged in dramatic writing. His comedy, *The Heiress*, 1786, achieved success. He died June 3, 1792, and was buried in Westminster Abbey. F.M. Sir John Burgoyne (*v.i.*) was his illegitimate son.

Burgoyne, Sir John Fox (1782-1871). British military engineer who advised Lord Raglan during the Crimean War. An illegitimate son of General John Burgoyne (*v.s.*), he was born July 24, 1782, and entered the Royal Engineers, 1798. He served in the Peninsular War, 1808-13, and in 1814 in the war with America, 1812-14. Inspector-general of fortifications, 1845-68, he played a conspicuous part in the Crimea, and was much criticised for the strategy of the approach to Sevastopol. He was made a baronet in 1856, constable of the Tower of London in 1863, and a field marshal in 1868. He died in London, Oct. 7, 1871.



Sir John Burgoyne,
British soldier

Burgrave. Title of an important official in Germany during the Middle Ages and later. It means count of the borough or town (*Burggraf*) as opposed to landgrave (*Landgraf*), count of the country or land. Burgraves were originally the protectors of the towns. For centuries members of the Hohenzollern family were burgraves of Nuremberg.

Burgundians. French faction which came into existence about 1396, its opponents being the Orleanists or Armagnacs. The struggle between the two parties—the Burgundians, led by Duke Philip the Bold and from 1404-19 by John the Fearless, and their rivals who followed the house of Orleans—was for supremacy in France, and only ended in 1435, when Philip the Good of Burgundy signed the treaty of Arras with Charles VII of France. From 1420 the Burgundians had supported the English cause against the French. See France: History.

Burgundy. Name applied at different times to different districts, kingdoms, duchies, and counties in the E. and S.E. of France and the adjacent parts of Switzerland. Roughly speaking, all the Burgundies, ten in number, were in the neighbourhood of the valleys of the Rhône and the Saône, and around the cities of Dijon, Besançon, Geneva, Lyons, Arles, and Vienne.

The name comes from the Burgundians, a Teutonic tribe living at one time between the Oder and the Vistula. Moving W., they settled round Worms; then, migrating S., they founded about 400 a kingdom which extended along the valleys of the Rhône and the Saône from Dijon to the sea. This was the first Burgundy; it lasted until 534, when it was destroyed by the Franks. The second Burgundy, smaller and dependent on the Franks, was in the same region, and only endured for about 50 years.

Burgundy was part of the wide lands ruled by Charlemagne, and when these were divided it was partitioned between the emperor Lothair and Charles the Bald in 843. About 880, when throughout the dying empire of Charlemagne independent princes were springing up, a certain Boso founded a kingdom which was called the kingdom of Burgundy or Provence. It included Provence, part of Savoy, and the land between the Saône and the Jura mts. About ten years later another Burgundy was founded to the N. of the former, and as the two were separated by the Jura they are sometimes called Cisjurane and Transjurane Burgundy.

The Kingdom of Arles

In 937 these two Burgundies were united under one ruler. In 1032 its king died childless, leaving it to the German king, Conrad II. The French objected to this and the count of Champagne appeared as a rival, but Conrad was strong enough to conquer the greater part of it. Thus this Burgundy became part of Germany, and its crown was one of the four worn by the medieval emperors, four of whom were crowned kings of Burgundy. The kingdom is often called, from the name of its capital, the kingdom of Arles. In the 15th and 16th centuries a considerable part of this Burgundy became part of France, who secured more of it when Savoy was annexed in 1861. Part is now included in Switzerland.

There were no more Burgundian kingdoms, but the name was perpetuated by duchies and counties under the overlordship of the kings of France and Germany. The first of these was composed of lands now part of Switzerland, but

it had passed away before 1400. More notable is the free county of Burgundy, Franche Comté, at first that part of the kingdom of Burgundy or Arles between the Saône and the Jura, but later much larger. It dates from the 9th century and its capital was Besançon. From 1384 to 1477 it was ruled by the dukes of Burgundy and formed part of the Empire. Louis XIV seized it, and in 1679 it was formally ceded to France. It now forms the departments of Jura, Doubs, and Haute-Saône. Before the 14th century there was a landgraviate of Burgundy and later a circle of Burgundy, one of the circles into which Germany was divided by Charles V. This included not only Franche Comté, but also the Netherlands.

Charles the Bold

Of all the Burgundies the most important was the great duchy ruled in the 15th century by Philip the Good and Charles the Bold. This originated in 1032, when that part of the kingdom of Burgundy which remained part of France was made into a duchy and given by Henry II to his brother Robert. It lay around Dijon, being the northern part of the old kingdom. Robert's successors ruled it as vassals of the French kings until the extinction of the family in 1361. In 1363 King John II gave the vacant duchy to his younger son, Philip, called the Bold, and twenty years later this duke secured Franche Comté and Flanders. He became as strong as the king of France, to whom both he and his son, John the Fearless, were very troublesome. In John's time France was distracted by the civil war between the Burgundians and the Orleanists or Armagnacs, and in 1420 Philip the Good made an alliance with England.

Under these dukes Burgundy continued to expand, and in 1435 Philip was rewarded with more lands for deserting England. Under him Burgundy was prosperous, and he is the founder of the famous Order of the Golden Fleece, really a Burgundian institution. The next duke was his son, Charles the Bold, the rival of Louis XI of France. His unsuccessful design was to make Burgundy into a kingdom.

Charles left an only daughter, Mary, and there was much trouble about the disposal of his great inheritance. Asserting his claim as overlord, Louis XI took possession of Burgundy; as a reply, Mary married Maximilian, the future emperor, who prepared to defend his wife's rights. In 1482 Mary died and Louis obtained the Duchy of Burgundy, but

Franche Comté went to Maximilian. Thus Burgundy's independent existence came to an end; henceforward it was merely part of France, being first a province, and after the Revolution divided into departments. For a long time it had its own assembly of estates which met at Dijon, where also a *parlement* sat. The name, but nothing else, was revived in 1682, when Louis XIV made his grandson duke of Burgundy.

Burgundy. Generic name of wines grown in Burgundy, France. The soil being impregnated with iron, the wines have a great reputation for sufferers from anaemia. The region of Côte d'Or produces the finest, the general inclination of these hills being S.W.—the best aspect for maturing the grapes. Burgundies are either white or red, but the red predominate. All are characterised by rich flavour, fair alcoholic strength (from 19 to 22 p.c.), good keeping powers, and fine bouquet. Chief among white burgundies are Meursault, Chablis, and Montrachet. The chief red burgundies are: Beaune, Chambertin, Clos-de-Vougeot, Nuits, Pommard, Richebourg, Romanée, Santenay, and Volnay. The chief export centre for burgundies is Beaune.

Burgundy Mixture. Liquid for the destruction of fungus, sometimes called soda Bordeaux mixture. Of French origin, it is a solution of copper sulphate and sodium carbonate, and should be applied to the under surface of the leaves.

Burhanpur. Town of India, in the Nimar dist. of the Madhya Union. It is on the Tapti river, 185 m. W. of Nagpur. An important town under the Moguls, it was captured by Wellesley in 1803, and became British in 1860. It has the ruins of a 16th-century palace built by Akbar and a 17th-century mosque built by Aurungzebe. A cotton centre, it also makes shellac and mills oilseeds. Its once-famous handicrafts (e.g. making gold and silver wire and brocade) persist on a small scale. Pop. (est.) 55,000.

Burial. Method of disposing of the body of a person who has died. In Great Britain there is no legal objection to other methods—e.g. cremation—so long as the requirements of the law are observed. Burial need not be in consecrated ground and, with some exceptions, may be on private ground.

Until 1880 burial in consecrated ground could take place only with the burial service of the Church of England; a great hardship to nonconformists. Accordingly, the

Burial Laws Amendment Act, 1880, provided that, on proper notice, a burial may take place on consecrated ground without the C. of E. or indeed any service. The executors of a deceased person are responsible for disposing of his body. Every inhabitant of a parish or anyone who dies therein is entitled to be buried in the parish burial ground.

Persons who, in the words of the Book of Common Prayer, have died "unbaptized or excommunicate or have laid violent hands upon themselves" cannot be buried with the C. of E. service. Until 1823, suicides might be buried in the highway impaled with a stake. The Act of 1880 enabled them to lie in consecrated ground. In early times burials took place within the church itself and even today persons of importance may be buried in church, e.g. Westminster Abbey. The increasing pop. in the 19th century made new burial grounds necessary and Acts enabled them to be obtained by gift or purchase. Companies were also formed to provide cemeteries; they were carried on for profit, no person having a right to be buried there merely as the inhabitant of a parish. These cemeteries were provided with a statutory code by the Cemeteries Clauses Act, 1847.

Burial Acts

The Burial Acts, beginning 1852, introduced a new system under which a board, elected by the vestry, would provide and maintain a burial ground. The functions of a burial board are now frequently carried out by some local authority. The fees must be approved by the minister of Health. In a burial ground provided in this way, and in a cemetery, part of the land may be consecrated and part unconsecrated. Under the New Parishes Measure, 1943, the Ecclesiastical Commissioners may also acquire land for burial.

A body may not be buried before a registrar's certificate has been obtained when the death is registered. If the registrar refuses to register death, a coroner's order is required before burial can take place. Burials must be registered in books kept for the purpose. During the Second Great War special regulations were made relating to the burial of persons who had been killed in an air raid or had otherwise died in consequence of war operations. Burial grounds may be closed by Order in Council.

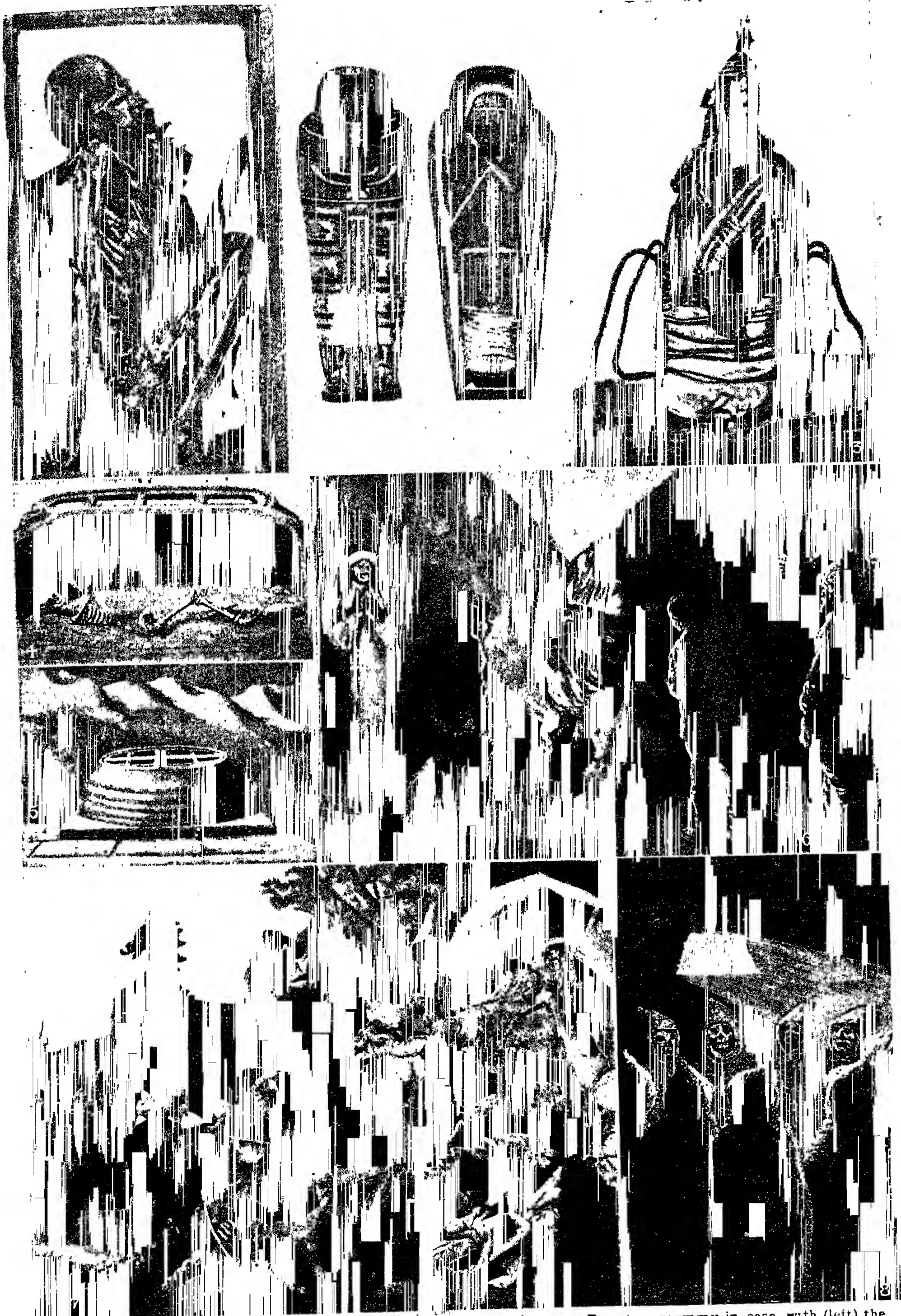
No building may be erected on a disused burial ground except for the purpose of enlarging a church or other place of worship, unless the ground has been sold under the authority of parliament.

Burial Customs. Usages and rites associated with the disposal of the dead. The primal custom was doubtless some form of deposition in the open air.

The body may be laid in the jungle, leaf-covered or earth-covered, extended upon a hill-top under grass, or suspended in a tree as in New Caledonia. Tree-burial, as in N.W. Australia and Ceram, may pass into platform-burial, as in Central Australia and among the Dakotas and Yakuts; this is sometimes reserved for honorific use, as in the Andamans and Assam. The body may be swung hammock-wise between two poles, as in Nyasa. Exposure may be dictated by the geographic conditions, as among the Samoyeds on the frozen tundra, or designed to secure desiccation before interment, as among the Gilyak. Exposure to wild animals upon the steppes, as among the ancient Scythians, was adopted by Zoroaster, and is retained in the Parsee towers of silence (*dakhmas*). After the dead have been unflashed by birds, the bones are swept half-yearly into the central pits. In Tibet the skull of a body eaten by vultures is valued for use as a precious libation bowl.

Cave-burial is of high antiquity. The simultaneous use of caves for habitation and sepulture gave way to the consecration of separate rock-shelters for interment. Caves inhabited by an earlier race were utilised in Britain and elsewhere for Neolithic and Bronze Age burials.

Earth-burial occurs in every phase of culture. Many of the early modes of inhumation (see Barrow; Stone Monuments) still survive. The body may be accompanied by a spear, as among the Bushmen; a calabash of milk, as among the Masai; a cake, as in parts of India; cooking pots and gongs, as in Burma; a dog, as in Greenland; bead-currency and slaves, as among the Congo chiefs; and favourite wives, as in Fiji. The sitting posture beneath a cairn is widespread, as, for instance, with the Somali and Masai; the cairn may be surrounded by a circle of carved posts, as among the Bonga. All may be covered except the head, as among the Kavirondo, or the hand, as among the Abyssinian Saho. The coffin may be a turtle-



1. Prehistoric skeleton buried in a crouching position, N. America. 2. Egyptian mummy in case, with (left) the inscribed lid. 3. Peruvian mummy in cloth bale. 4. Babylonian tomb opened and, 5, the exterior. 6. Cremation in Nepal. 7. Pyre of Russian chieftain (10th cent.). 8. Embalmed bodies in an Aymara tomb (S. America)

BURIAL CUSTOMS : METHODS OF DISPOSING OF THE DEAD IN ANCIENT TIMES

shell, as with the Seri; a hollow tree, as with Obongo; a buffalo hide, as with Bechuana; or a canoe, as in Brazil. A viking was often placed in his ship and a barrow heaped upon it, as at Gokstad, or the ship, as in the Balder myth, was set afire and drifted out to sea.

Embalming, best known in Egypt, was also practised by the Guanches as well as in Burma and Melanesia, and in ancient Peru. Smoke-preservation, as in Australia; painting with red, as with Niamniam; desiccation by fire, as in China; or partial roasting, as in the Upper Congo, are doubtless also intended to preserve the body after death. An opposite order of ideas led to the custom of cremation.

Burial Society. Term having no precise legal meaning, but used popularly to indicate an association of persons the members of which periodically pay money into a fund to provide death benefits. Many of these societies began with the object of paying the funeral expenses of members or of certain relatives of members. When the death grant provisions (which included funeral expenses) of the National Insurance Act, 1946, came into effect it was thought unnecessary that burial societies should also insure for funeral expenses, and accordingly by the Industrial Insurance and Friendly Societies Act, 1948, such insurance by a burial society which was a registered friendly society was made illegal as from July 5, 1949.

Buriat-Mongol. Autonomous republic of the R.S.F.S.R. It lies E. and S. of Lake Baikal, touching Tuva, Irkutsk, and Chita regions on the W., N., and E., the Mongolian People's Republic on the S. Area 135,700 sq. m., about three-quarters of which is covered by coniferous forests. The capital is Ulan-Ude. The Soviet system was adopted in 1920, and education made rapid progress; there are some 20 technical colleges and higher institutions. Cattle-breeding is the chief occupation of the people, who number approx. 600,000. Some 50 p.c. of the inhabitants are Buriats, formerly nomadic but settled under the Soviet regime; most of the rest being Russians and Tungus. Gold, iron, tungsten, molybdenum, and petroleum are among its mineral products.

Buridan, JEAN (c. 1300-58). French scholastic philosopher. He was born at Béthune (Artois), and became rector of the university of Paris in 1347. A nominalist and disciple of William of Occam, he

declared it was impossible to decide whether the will, in like conditions, can decide for or against any action. He is said to have adduced the fable of the ass, which, placed midway between two similar bundles of hay, is unable to move, being equally attracted by both. Buridan, in his text-book of logic, gave rules for rapidly finding the middle term of a syllogism which might enable even the dullard to appear wise: hence its name *pons asinorum* (asses' bridge).

Burin (Fr.). Cutting tool for the engraving of metal in line. It consists of an obliquely ground steel blade mounted in a handle. See Engraving.

Burin. Town and port of entry of Newfoundland. Situated on the E. coast of Burin peninsula, it has a good harbour and is a fishing centre. The peninsula extends for about 75 m. between Placentia Bay and Fortune Bay. Pop. 3,500.

Burke, EDMUND (1729-97). British statesman and writer. Born in Dublin Jan. 12, 1729, of a Protestant father and Roman Catholic mother, he graduated at Trinity College, Dublin, in 1748. In 1750 he began to keep terms at the Middle Temple, but was never called to the bar. In 1756 he married Jane Nugent, a Catholic, who turned Protestant on marriage. The same year he established his literary reputation by his *Vindication of Natural Society*, a clever imitation of Bolingbroke; and his *Philosophical Inquiry into the Origin of our Ideas of the Sublime and Beautiful*.

Contributions to Dodsley's *Annual Register* from 1759, secretarial services to "single-speech" Hamilton in Ireland until 1763, and convivial evenings with Garrick, Reynolds, and Johnson at the Turk's Head, gave him an active interest in public affairs. In 1765, being then private secretary to the premier, Lord Rockingham, Burke entered Parliament for the pocket borough of Wendover. He became one of the foremost opponents in debate and in print of George III's attempt to restore personal government; and in opposition he supported the Wilkes agitation, and denounced the use of soldiery against the mob and government interference in the Middlesex election of 1769. Although the political struggle turned largely upon personal rivalries, Burke perceived the great constitutional issues involved, and in 1770, in his *Thoughts on the Causes of the Present Discontents*, he clearly contrasted the new system, based upon royal autocracy and court intrigue, with the old system,

which placed government authority in a cabinet responsible to a free parliament.

His next interest was the protest of the colonists in America against the attempts of the home govern-



Edmund Burke.

From a portrait by Sir J. Reynolds

ment to tax them. Brushing aside claims of legal validity, Burke denied the expediency of the government policy. In 1771 the province of New York appointed him agent at £500 a year. In 1774 he requested the repeal of the tea duty in a speech published that year as the *Speech of Edmund Burke, Esquire, on American Taxation*. Every one of the punitive measures taken by the Government against the Boston rioters elicited strong protests from him. In 1775 he proposed 13 resolutions for reconciliation with America, but, finding his advocacy ineffectual, in common with his party he ceased to attend the American debates. The protests of his constituents against his American policy drew from him his *Letter to the Sheriffs of Bristol* (published 1777). His position was weakened in 1779 by his plea for the relief of Irish and Scottish Catholics, and, declining to contest Bristol in 1780, he accepted a seat for Malton.

Rockingham returned to power in 1782, and Burke was made paymaster-general without cabinet rank. He passed his bill for the economical reform of Parliament, and then, on Rockingham's death, resigned only to return as paymaster in Portland's ministry, really the notorious coalition ministry of Fox and North. In it he busied himself upon Indian affairs, served on the select committee, and drafted the 9th and 11th reports upon the affairs of

Bengal. He was also responsible for the drafting of Fox's India Bill, upon which the administration was turned out by the king. He was elected lord rector of Glasgow university in 1783-84, and in 1785 began the great attack which in 1787 resulted in the impeachment of Warren Hastings.

The last period of Burke's career in opposition is the least pleasant. He was inconsistent in his attacks upon Pitt's Irish policy, the Regency Bill, the India Bill, and Fox's Bill for the repeal of the Test and Corporation Acts. Then the French Revolution of 1789 threw him into an attitude of complete reaction. Opening his attack upon it in his *Reflections on the Revolution in France* (Nov. 1, 1790), which ran through as many as 11 editions in the first year, he followed it in 1791 by his *Letter to a Member of the National Assembly, An Appeal from the New to the Old Whigs*, and *Thoughts on French Affairs*. His attitude brought him world-wide fame and popularity, the king's favour, and in 1793 pensions of £1,200 per annum and £2,500 per annum. It also lost him his friendship with his two old allies, Fox and Sheridan. It broke his party when he sat on the ministerial side in 1792, whither he was followed by the bulk of Portland's partisans. But his career was already run. He retired from parliament in 1794. His last work was his *Letters on the Prospect of a Regicide Peace*, 1796. He died on July 9, 1797, and was buried in the parish church of Beaconsfield.

Burke as Whig Leader

Although a failure as a speaker, and influential chiefly as a writer, Burke was the brain and inspiration of the Rockingham Whigs. He maintained the Walpolean traditions of religious toleration, public liberty, financial reform, and an indulgent colonial policy. A practical politician, he taught that true statesmanship must often prefer expediency to principle. For him the Revolution of 1688 was of divine origin, and he has given the most lucid exposition of its working principles, its checks and balances, that secured individual and communal freedom. Accepting the evolution of political practice up to his own day—placemen, pensioners, and rotten boroughs—he fiercely opposed all suggestions of parliamentary redistribution.

Burke saw society as a naturally evolved state of stable equilibrium, an organic growth, not a human invention, which corrected

itself, but was disordered by human interference. For the moment the inspiration of anti-reform, he became the apostle of Conservatism for all time. Hence his attack upon the French Revolution as an act of wanton destruction; hence his willingness to purchase its suppression at the price of European bankruptcy and decimation. He steadied English opinion, and was one of the chief influences in determining English foreign policy against revolutionary ideas. He will be best remembered, however, for his stately and sonorous prose, revealing therein the scope and power of the English language, and making him, as Lord Morley has said, "one of the great masters of the high and difficult art of elaborate composition."

Arthur Jones

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Burke, SIR JOHN BERNARD (1814-92). A British genealogist. Born in London, Jan. 5, 1814, son of the compiler of the Peerage and Baronetage, he was educated at Caen, and called to the bar in 1839. In 1854 he was knighted. In 1866 he was sent to Paris to report upon the French record system. He annually re-edited his father's Peerage from 1847 until his death, at Dublin, Dec. 12, 1892. His own works include *The Roll of Battle Abbey*, 1848; *The Romance of the Aristocracy*, 1855; *Vicissitudes of Families*, in three series, 1859-63; and *The Book of Precedence*, 1881.

Burke, MARIE (b. 1894). British actress and singer. Marie Holt was born in London, Oct. 18, 1894, and trained in Italy for an operatic career. She scored a success in *Afgar* at the London Pavilion in 1919, and visited the U.S.A., S. Africa, and Australia. After Katja the Dancer came her most memorable performance in *Show Boat* at Drury Lane, 1928. Her fine contralto was heard also in *The Student Prince* and *Waltzes from Vienna*. She married Thomas Burke (b. 1890), a Lancashire miner whose



Marie Burke, British actress and singer

remarkable tenor led him to study under Colli at Milan, 1913-17. He appeared at Covent Garden with Melba in *La Bohème* in 1919, and made successful tours in the U.S.A. Later he turned to musical comedy in London. Their daughter Patricia (b. 1917) achieved fame in revue, musical comedy, and pantomime, played the lead in *The Lisbon Story*, and was at the Old Vic, 1947.

Burke, ROBERT O'HARA (1820-61). British explorer. Born at St. Clerans, co. Galway, and educated



Robert O'Hara Burke, British explorer

in Belgium, he served in the Austrian army. Returning to Ireland, in 1848 he joined the Irish constabulary, and five years later emigrated to Australia, and was appointed police inspector in Victoria. In 1860 an exploring expedition was sent from Melbourne to cross Australia from S. to N., and Burke was placed in command of this. He arrived at Cooper's Creek on Nov. 11, and with three companions, Wills, King, and Gray, pushed on to the Gulf of Carpentaria, reaching the tidal waters of Flinders river on Feb. 9, 1861. They were thus the first white men to cross Australia from S. to N. Minus Gray, who died on the way, they arrived back at Cooper's Creek on April 21.

Burke then tried to reach the S. Australian stations, but was forced by want of water to return to Cooper's Creek. He died of starvation, June 28, 1861, Wills surviving him only a few days. King was befriended by aborigines and rescued by a relief force which arrived in Sept. The bodies of Burke and Wills were recovered, taken to Melbourne, and given a public funeral, Jan. 21, 1862.

Burke, THOMAS (1887-1945). British author. Born in the East End of London, he was early orphaned and brought up by an uncle in Poplar and at a country orphanage. After working as office boy and free-lance writer, he was employed by a literary agent. *Limehouse Nights* in 1916 made his name, and he developed into one of the most knowledgeable, intimate, and charming writers on London. His fiction, poems, and books on the country and inns were attractive equally for style and matter. The film *Broken Blossoms* was based on Burke's

story *The Chink and the Child*. He died Sept. 22, 1945.

Burke and Hare. Murderers and body snatchers. William Burke (1792-1829) and William Hare (c. 1790-c. 1860) inveigled people into Hare's lodging house in Edinburgh and killed them, then sold their bodies to Dr. Robert Knox for surgical dissection. Within twelve months from Nov., 1827, they murdered at least 15 persons for this purpose. Hare turned king's evidence, and Burke was hanged Jan. 28, 1829. Hare is believed to have died, a blind beggar, in London, about 30 years later. Their victims were made drunk and then suffocated; hence arose the use of the verb to burke, meaning quietly to suppress anything. Their activities led to the passing of the Anatomy Act, 1832 (see under *Anatomy*).

Burke's Peerage AND BARONETAGE. British publication the full title of which is *Burke's Genealogical and Heraldic History of the Peerage, Baronetage and Knightage, Privy Council and Order of Precedence*. John Burke (1787-1848), who came of a family of Irish gentry, moved to London and wrote and published many books on genealogy and heraldry. In 1826 he produced the first edition of his *Peerage*, explaining in a preface that he had undertaken its production because no work of reference then existed containing authoritative family histories of the peers and baronets of the United Kingdom. In later life he was assisted by his son John Bernard Burke (q.v.). Issued at irregular intervals until 1847, the publication then became an annual until 1939; thereafter the first completely revised edition, which was also the first to appear after the Second Great War, was published in 1949. Further editions appeared at intervals.

Burleigh, BENNET (c. 1840-1914). British war correspondent. Born at Glasgow, he fought on the Confederate side in the American Civil War, being twice sentenced to be shot by the Federals. Making his reputation as war correspondent for the *Central News* during the bombardment of Alexandria, he represented *The Daily Telegraph* in some twenty-five campaigns, 1882-1913, when he retired. He was in Egypt, the Sudan, Ashanti, Madagascar, S. Africa, Manchuria, Tripoli, and the Balkans. He published *The Empire of the East*, 1905. He died June 17, 1914.

Burlescombe. Parish and village of Devon, England. It is

8 m. E.N.E. of Tiverton, on the railway. It has remains of an Augustinian priory founded during the reign of Henry II. Limestone is worked in the district. Pop. 637.

Burlesque (Ital. *burlesco*, absurd). In dramatic and other literature, a ludicrously exaggerated perversion of a serious or pretentious original; more for the purpose of getting fun out of it than of satirising it. It is allied to parody, but is concerned more with the matter than the manner of its original. Dramatic burlesque is described by A. W. Ward in his *History of English Dramatic Literature* as "the ironic species of which Aristophanes was the unequalled master, and in which the characters stand in laughable contrast to the action that they carry on, or even to the diction they use."

In general literature some of the most notable examples of burlesque are Chaucer's *Rime of Sir Thopas*, ridiculing in gentle fashion the lesser rhymers of his day; Don Quixote, ridiculing romances of chivalry; and Butler's *Hudibras*, ridiculing the Puritans. In the drama, striking examples of burlesque are Beaumont and Fletcher's *Knight of the Burning Pestle*, Buckingham's *The Rehearsal*, 1672, Gay's *Beggars' Opera*, and Sheridan's *The Critic*. In the latter half of the 19th century burlesque enjoyed great popularity in the theatre, the most successful exponents being Sir F. C. Burnand and Sir W. S. Gilbert. Burlesque in the U.S.A. (*pron. burlikew*) is roughly the equivalent of the English music-hall entertainment.

Burlinghame, ANSON (1820-70). American diplomatist. Born in New York state, Nov. 14, 1820, he was educated at Michigan and at Harvard. He practised as a lawyer at Boston, and in 1852 was elected to the senate of Massachusetts, and in 1854 to Congress. Seven years later he was sent as minister to China, remaining there until 1867. The Chinese government having made him their envoy, in 1868 he arranged the treaty between China and the U.S.A. sometimes called by his name, and later arranged other treaties between China and several European Powers. He died at St. Petersburg (Leningrad), Feb. 23, 1870.

Burlington. City of Iowa, U.S.A., the co. seat of Des Moines co. It is on the Mississippi, 207 m. by rly. S.W. of Chicago. Known as the Garden City, it is the seat of Burlington College and has a free library, a court house, an opera

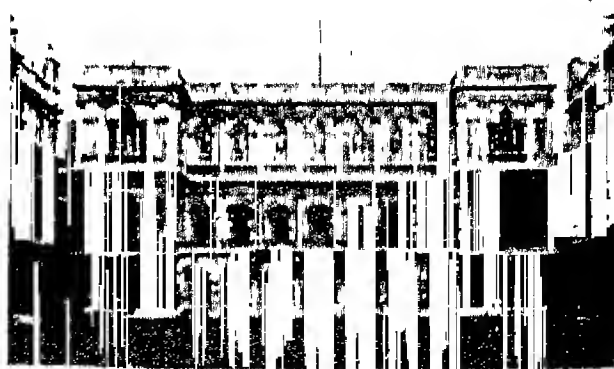
house, and a fine park of 82 acres. It has large rly. repair shops, foundries, and boiler and machine works, and manufactures soap, flour, furniture, desks, pearl buttons, confectionery, and engines. Founded in 1834, Burlington was incorporated in 1837, and became a city in 1838. Pop. (1950) 30,613.

Burlington. Largest city of Vermont, U.S.A., the co. seat of Chittenden co. It is on Lake Champlain, 40 m. W.N.W. of Montpelier, and is served by rlys. and canal. It is the seat of the university of Vermont and state agricultural college, and has a R.C. cathedral, and two libraries. A port of entry, with a secure harbour, Burlington has a trade in timber, stone, and marble, and cotton, woollen, and planing mills. The town became a city in 1865. Pop. (1950) 33,155.

Burlington, EARL OF. British title borne by the duke of Devonshire. It was given in 1831 to George Augustus Cavendish, a younger son of the 4th duke of Devonshire; he inherited the great wealth of his uncle, Lord Frederick Cavendish (1729-1803), the field-marshal, and was succeeded by his grandson William, who in 1858 became duke of Devonshire. An eldest son of the marquess of Hartington (q.v.) is called earl of Burlington. An earlier creation, 1664, in favour of Richard Boyle, 2nd earl of Cork, became extinct 1753.

Burlington Arcade. Covered thoroughfare in the W. of London, leading from Piccadilly to Burlington Gardens. Built in 1819 as a bazaar by the earl of Burlington, then Lord George Cavendish, it is upwards of 200 yds. in length and has shops on each side and a gate at each end. It suffered damage, especially the N. end, from German bombers in 1940. Immediately E. of the Arcade is Burlington House.

Burlington House. Public building in Piccadilly, London. It consists of two parts, Old and New.



Burlington House, London, where the Royal Academy exhibitions are held

Old Burlington House was built by an earl of Burlington early in the 17th century, and was purchased

by the government for £140,000 in 1854. Since 1866 it has been lent to the Royal Academy of Arts (*q.v.*). New Burlington House, to the S., built by the government in the grounds of the original house, houses the Royal Society; the British Association; the Society of Antiquaries, and other learned bodies. Behind Burlington House in Burlington Gardens is the headquarters of the Civil Service Commission, erected in 1869, and long the home of London University.

Burma, UNION OF. An independent republic of Asia, situated between lat. 28° N. and 10° N., and long. 92° E. and 101° E. On land it adjoins India (N.W.), China, Laos, and Siam (E.). The Bay of Bengal lies to the W. The maximum length of the country is about 1,200 m., and its greatest width, just S. of Mandalay, 575 m. Area approx. 262,000 sq. m.; pop. (1954 est.) 19,242,000.

The union comprises the territory formerly administered by the British government through the governor of Burma; the former Karenni states of Kantarawaddy Bawlake and Kyebugyi (combined in the Karen state); the former federated Shan states and Wastates (combined in the Shan state); the Myitkyina and Bhamo districts (combined in the Kachin state).

Burma is divided by a river and mountain system, the mountains being an extension of the great Himalayan complex to the N., here running southwards after making a right-angle bend. The country falls into three main divisions, with a distinct N.-S. trend. The central basin, formed by the valleys of the Chindwin (600 m.), Irawadi (1,250 m.), and Sittang (350 m.), fans out in the south into the delta region around Rangoon. To the N. and W. of this is a great mountain arc, the Arakan Yoma with the associated ranges of the Chin and Kachin Hills forming an effective barrier between Burma and India. The Shan Plateau occupies all the eastern part of Burma, and extends S. as the Tenasserim range, with the river Salween (1,750 m.) running S. through the middle in a large valley before emerging at Moulmein in the Gulf of Martaban.

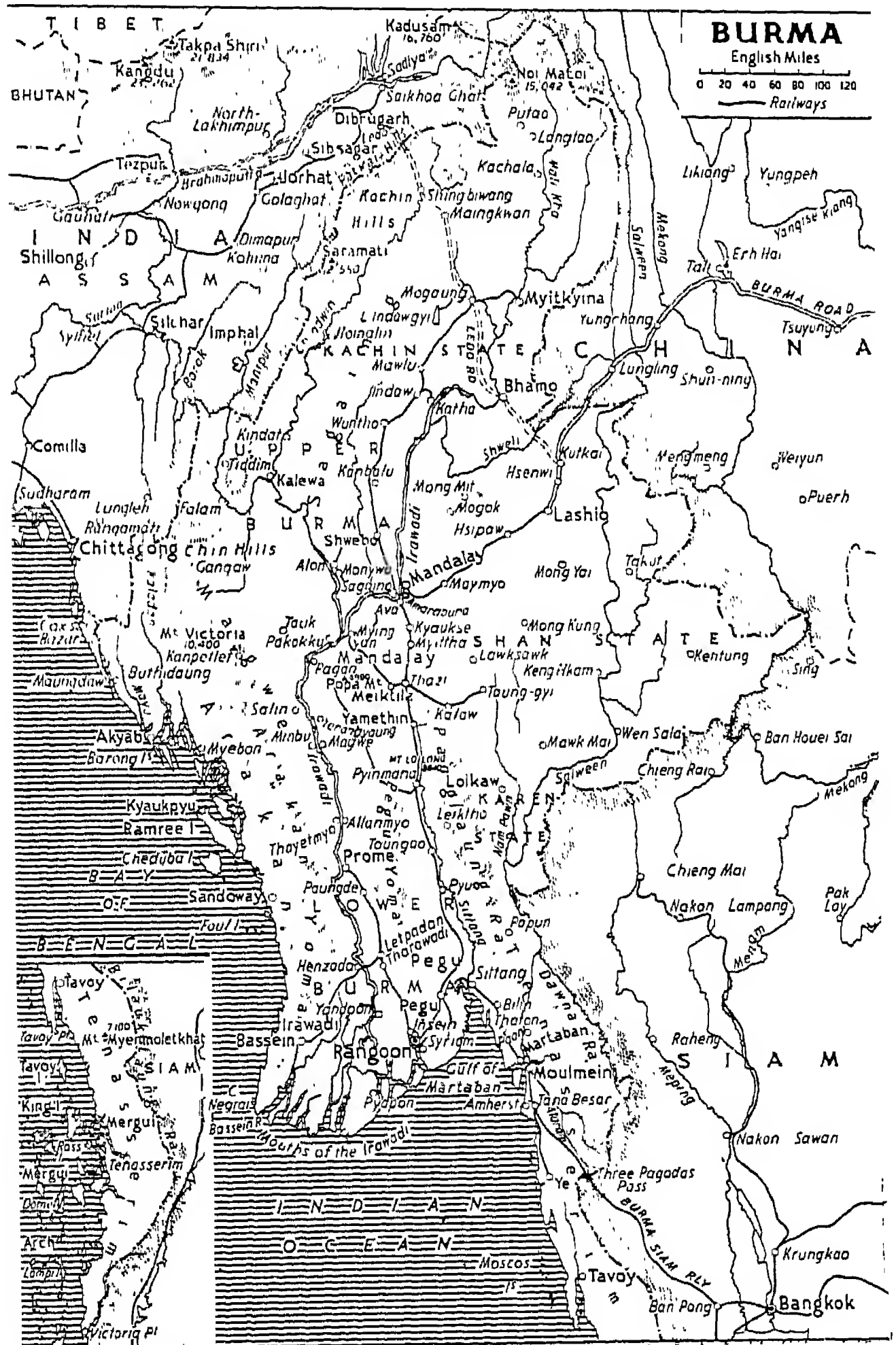
The narrow coastal strips of Arakan in the N. and Tenasserim in the S. extend along the west of the mountain ranges. Off the Tenasserim coast lies the Mergui Archipelago, famed as a pearling ground. The largest island is King Island, lying opposite the mainland town of Mergui.

In the western hills a number of peaks exceed 10,000 ft., the highest being Mt. Victoria, 10,400 ft., and Saramati, 12,550 ft. N. of Rangoon is the Pegu Yoma, and farther N. still, between the Irawadi and the Sittang, is Mt. Popa, 4,980 ft., an extinct volcano with which many legends are associated. The Shan Plateau, much dissected, has an average altitude of 3,000 ft.; but Mt. Loilong reaches 8,840 ft. In the Tenasserim range the highest peak is Mt. Myenmoletkhat, 7,100 ft.

Along the coast lie mangrove swamps and tidal forests. In wetter Tenasserim there are evergreen tropical forests on the lower levels, with oaks, chestnuts, and rhododendrons at higher elevations. The Irawadi valley of Lower Burma has a mixed forest vegetation, with bamboos and

climbing plants common. A coarse grassland is found near the river, with occasional stretches of swampy jungle. The higher areas of the Pegu Yoma are covered by a deciduous forest bare of leaves in summer. In the drier north there is scrubby desert. Typical *tarai* jungle covers the western part of the Shan Hills, merging into evergreen forest at higher levels, while the rolling plateau surface has a temperate vegetation.

Big game abounds in most parts of Burma; elephants are found in the N. and in some parts of the S.; tigers are general except in the dry zones; leopards are even more common. Rhinoceros occur in some swampy places, and bison, many varieties of monkey, crocodiles, cobras, pythons, and other snakes, turtles, and smaller tropical animals abound. There is a



great variety of birds, including pelicans, vultures, and hornbills.

The climate is dominated by the monsoon, but generally speaking Burma may be divided into a dry zone (Upper Burma) and a wet (Lower Burma). The rugged northern hills, with an average rainfall of 80 ins., stand apart from this division. The dry zone, annual average 24-40 ins., is neither excessively hot nor unhealthy. Precipitation in the wet zone varies between 180 ins. on the coast and about 62 ins. inland, though the wettest parts may have as much as 250 ins. annually. Rangoon, the capital, which stands a little inland from the S.-facing coast, has an average of 97 ins. The wet season runs from mid-May to mid-Sept. The cool season, from Nov. to Feb., is the pleasantest part of the year; from mid-Feb. temperatures rise steadily until the arrival of the rains in May. Summer temperatures rarely rise above 94° F., except where rainfall is light, when they may exceed 120° F. The lowest winter temperatures are about 50° F. in the northern hills, and 60° F. in the S.

COMMUNICATIONS AND ECONOMY. There is no rail link between Burma and its northern neighbours, India and China, but to the S. the Burma-Siam railway (*v.i.*) joins Moulmein with Bangkok. The military Ledo Road developed during the Second Great War to link Assam and Burma was abandoned in Nov., 1945. The "Burma Road," from Lashio, Burma, to Chungking, China, completed 1938, continued in use.

Importance of Rivers

The rivers are the traditional means of transport and provide thousands of miles of safe waterway. The main artery is the Irawadi, navigable as far as Bhamo, giving a total navigable length, with its tributaries and affluents, of 1,700 m. The Salween, Sittang, and Ataram are also navigable over long stretches, and the Chindwin extends the river traffic far into the north. The first railway dates from 1869; before the Japanese invasion in 1941-45 there were 2,250 m. of track, much of which was destroyed, but after the war it was gradually replaced and improved. There is an internal airway network linking all the large towns in the country, as well as providing services to neighbouring countries.

Burma has never been a manufacturing country, and, apart from

rice milling and oil refining, its industries are very small. One of the traditional rice-exporting countries of the East, it has an annual production of 6 to 8 million tons, of which about half is available for export; the main buyers are India, Ceylon, Indonesia, the other S.E. Asian countries, and Japan, though small quantities go to Europe. Other crops are sesame, tobacco, and ground nuts; rubber and cotton are grown, and a good deal of these crops is exported.

Mineral Production

Burmese petroleum, which is commonly thought to be a major resource, in fact represents only $\frac{1}{2}$ p.c. of the world's total production. It provides a consistent and profitable income, nevertheless. The main concentration is at Yenangyaung in central Burma. Altogether there are about 5,000 wells, producing some $\frac{3}{4}$ million gallons daily. Other important minerals include wolfram (Burma, with 10 p.c. of the world's supply, is a major producer), lead, tin, silver, and tungsten. A little gold is found, and Burma is world-renowned for rubies, sapphires, and jade, which for centuries has found a market in China. Hardwoods form the bulk of Burma's timber resources; in the production of teak Burma leads the world. Many of the best stands of timber are in extremely inaccessible inland hill districts, but the logs are floated down the many waterways to the coastal ports. Elephants are still extensively used for local timber transport.

Burma's position as one of the creditor nations of S.E. Asia is due to a world demand for her basic resources combined with a fortunate internal condition: freedom from famine, an even population distribution, her self-contained natural regions.

PEOPLE. Although the beginnings of Burmese history are little known, early settlement of the country appears to have come always from the N. and N.E., from China and Tibet, although Indian settlements along the coast have existed for many centuries. The Mon peoples, also called Talaings, who settled in the Irawadi delta, were migrants from China. The Karens, who probably came from the Gobi Desert area, spread over the whole of Burma from about the 2nd century A.D. Two early invasions of Shans, one in the 1st century B.C. into the Shweli

valley and another in the 7th century A.D. extending along the Irawadi and into Siam, both came from China. The Burmans proper migrated from Tibet, but their origins can only be guessed at. They seem to have entered the plain of Burma in the period 9th-11th centuries A.D., settling in the Kyaukse district and then spreading out in many directions. One of the latest incursions was that of the Kachins, who entered Burma from Tibet in the 17th century and settled in the northern hills.

The people are Tibeto-Burman, then, for the most part, Mongoloid in type, sturdy and brown-skinned, ranging from a pale gold to the much darker brown of the jungle peoples. They are one of the most independent of peoples, and are often called the "Irish of Asia." Cheerful, intelligent, and individualist, they are fond of colour and gay dress. Both men and women wear an ankle-length skirt, the *longyi*, which is tied round the waist and tucked into a fold—at the front by the men and at the side by the women. The men wear a loose white jacket, and coloured handkerchiefs on their heads. The women wear no headdress, but coil their long shiny black hair into buns or, on ceremonial occasions, into large topknots; their upper garment is a thin white blouse or jacket. Burmese women are fully emancipated, and are known for their graciousness, modesty, and neatness.

The people of the hill tribes are less advanced, and in the northern hills head-hunting is still practised. Of the more advanced tribes, the Karens occupy the Pegu Yoma and part of the delta area. The Shans inhabit the Shan Plateau, the Kachins live in the N., and the Chins in the Chin Hills of the N.W.

Religions of Burma

The chief religion is Buddhism, and the Buddhist influence has pervaded the whole of Burmese life, especially in the sphere of education, where the monastic schools have played a large part in keeping alight the torch of learning for hundreds of years. The Burmese pagoda, one of the most distinctive features of the country, is bell-shaped, and is found almost everywhere. Hinduism and Islam are fairly strongly represented; most of the hill-tribes are animists. Christianity has a small but active following.

The principal language is Burmese, belonging to the Tibeto-Burman group, and spoken by

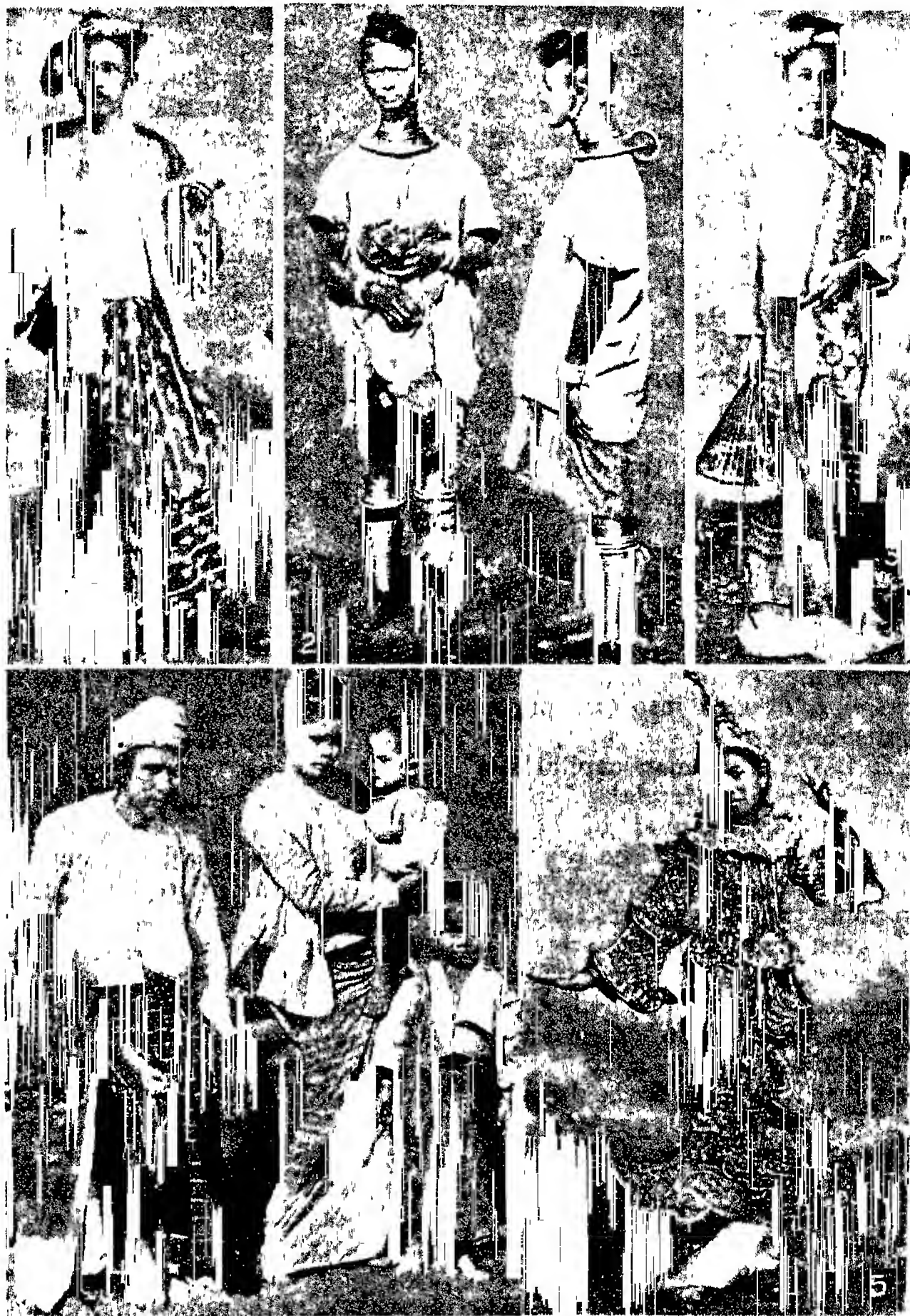
over 15 millions. Talaing, the older language of the S., is dying out rapidly. Arakanese, Thai, Karen, and Kachin are other indigenous languages; and yet other very localised languages and dialects are spoken. A variety of European and Indian languages is heard. English, long the language of administration, is still used as a medium in higher education, and is the second language of Burma.

HISTORY. The early history of Burma is obscure, and few records of any kind exist from before the Pagan period in the 11th century A.D. The country is referred to in the 2nd century A.D. by Ptolemy, and by early Chinese historians, but the first local records occur at Old Prome, being inscriptions made during the Pyu dynasty (ended 832 A.D.). The country was a series of small disconnected kingdoms until the Pagan period (1044–1287) when its unification was begun in the reign of the founder of the dynasty, Anawrahta (reigned 1044–1077). He brought under his rule most of Arakan, Lower Burma, and part of the Shan states, and had as his capital the now ruined Pagan, 120 m. S. of Mandalay. During his reign, also, the effects of Buddhism became important, and he was much influenced by the monk Shin Araham, and attempted the complete reform of his realm.

Developing Civilization

Anawrahta's most significant military enterprise was the conquest of Thaton, the Mon kingdom of S. Burma, in 1057. From the Thaton palace he carried away to Pagan the sacred Pali scriptures, the Tripitaka and other valuable books (as tradition has it, on 32 white elephants). The acquisition of a whole body of thought and learning had the greatest effect upon the Pagan court, and with the extension of contacts with the outside world, and in particular the religious centres of Ceylon, Burmese civilization developed greatly. Over 5,000 temples and pagodas remain from the Pagan period, and indeed the expense of building partly contributed to the crumbling of Pagan power before the double onslaught of the Tartars and the Shans. In 1287 Kublai Khan's grandson Ye-su Timur occupied Pagan.

There was then no notable Burmese ruling house until the beginning of the 17th century when the Toungoo kings in the S. increased in power. With Pegu as their capital they subjugated the



Burma. Types and costumes. 1. A man from Rangoon. 2. Padaung women with neckrings: they often wear 22 of these rings, weighing 40 or 50 lb. 3. A Mandalay lady. 4. Burmese family party. 5. Dancing girl

Burmese country of Ava. It was during this period that the first European contacts with Burma were made. In 1619 the Portuguese made a treaty at Pegu and established two factories near the present Rangoon and Moulmein. The Dutch visited Cape Negrais towards the end of the 17th century; soon after, the Hon. East India Company began to establish factories and agencies, including one at Ava, by then the political centre of the Toungoo kingdom.

In the mid-18th century the Talaings in the S. rebelled, burned Ava, and established another Pegu kingdom. But in 1752 the celebrated Burmese king Alaungpaya began to resist the Talaings and other invaders, and again aimed at consolidating Burma. In 1755 he founded Rangoon as a token of the defeat

of the Talaings: the name means "the finish of the war." This was a period of extreme hazard for Europeans, and both French and British traders were massacred and factories burned in the 1750s, not to be restored until 1762.

In 1782, after considerable warring and intrigue, the capital was moved from Ava to Amara-pura. In 1784, under King Bodawpaya, Arakan was conquered, bringing the Burmese into direct contact with the British in India. British missions to Amara-pura proved unsuccessful and were withdrawn in 1798. Burmese invasions of British territory in India provoked the 1st Burmese War, 1824–26, a campaign whose conduct has been severely criticised; it was concluded when the Burmese accepted the British terms

in the treaty of Ava, 1826. The treaty arranged for the cession of Tenasserim, Arakan, and other territories, the abandonment of Burmese claims on Assam and elsewhere, the appointment of political agents, etc.

The peace that ensued was uneasy; in 1839 the British resident was withdrawn, and in 1851, after considerable friction, matters came to a head when Burmese interference with the masters of two British merchant vessels provoked the 2nd Burmese War, 1852. This resulted in the annexation of Pegu province, including Rangoon. The British provinces in Burma (Arakan, Pegu, Martaban, Tenasserim) were in 1862 amalgamated to form the province of British Burma, with the administrative h.q. at Rangoon. Burma was thus divided into two parts, Upper and Lower.

In 1857 the Burmese capital had been moved to Mandalay, which remained the capital of Upper (Burmese) Burma. The reign of Mindon Min, 1853-78, was fairly tranquil, though relations between Rangoon and Mandalay were far from easy. Thibaw, Mindon Min's successor, proved a violent king, and in 1879 the British resident at Mandalay was again withdrawn. Unwilling to be held to treaties signed by his predecessors, and persisting in a threatening attitude, Thibaw began to court French support; but it was only after persistent attempts at arbitration that in 1885 a British force under General Prendergast was dispatched up the Irawadi; it compelled Thibaw to submit after an almost bloodless action. Thibaw's surrender was followed by his exile to India, where he died, 1916, the last of the kings of Burma. In 1886 Upper Burma was proclaimed British territory, and the unification of the country under a stable rule was interrupted only by small-scale revolts.

Growth of National Feeling

The following years saw the development of Burma's administrative machinery. In 1923 Burma became a governor's province, and the re-awakening of a Burmese national spirit became evident. In 1935, as part of the constitutional reforms of India, the Government of Burma Act established Burma as a separate political unit, with its own constitution, effective from April, 1937. The serious interruption of the war of 1941-45 delayed the further political development of the country;

but on Dec. 10, 1947, the treaty of Burmese Independence was passed by the British parliament, and on Jan. 4, 1948, Burma became a sovereign independent state. The choice of complete independence rather than dominion status reflects the Burmese faith in their long history as an independent nation. The negotiations between the United Kingdom and Burma were carried on against a background of internal unrest, and a shadow was cast upon the proceedings by the assassination, on July 19, 1947, of the Burmese leader Aung San and several of his cabinet. The treaty was completed under the leadership of Thakin Nu (later U Nu), who faithfully followed the policy of his predecessor. The new constitution secured the government in a bi-cameral legislature. The chamber of nationalities, with 125 members, is the "upper house"; the popular house is the chamber of deputies, with 250 members elected by popular vote, deputies normally holding office for a term of 4 years.

The domestic troubles which faced the new government came mainly from communist groups and from the Karens, who demanded for themselves an autonomous state, and rose in open rebellion in Aug., 1948. The Karens captured and held many important towns, including Mandalay, Prome, and Bassein, but were gradually subdued and, although continuing troublesome, were offered their own state with autonomy in all but defence, finance, foreign policy, and industry. Karen state was inaugurated on June 1, 1954, following legislation passed nearly three years earlier.

D. Matthews

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Burma Campaign, 1941-45. The Burma campaign of 1941-45 falls into three parts: (1) the retreat; (2) the period of holding and preparation; (3) the advance. An almost separate, but parallel, story is that of the building of a supply road to China—the Ledo Road.

THE RETREAT. The tale opens on Dec. 15, 1941, a week after Pearl Harbor. The Japanese, mobilised and ready, sprang at

Burma along the route opened to them by the defection of French Indo-China to Vichy and the surrender of Siam. Burma was vital to the Japanese, as its possession would isolate China from her Western allies, and force the British into a hurried defence of India in the border jungles of Assam.

Opposing the Japanese were General Hutton's slender forces—mainly the 1st Burma corps, to whose command Lt.-Gen. Slim had been rushed from the Middle East. But the Japanese were too strong on the ground and in the air for the defenders; and the fate of Burma was sealed when Rangoon was evacuated on March 7, 1942, for Rangoon had been the only supply base of Lt.-Gen. Alexander, first appointed to succeed Hutton—there were then no roads into Burma from India and air supply had hardly been heard of. There was no help but to withdraw until the supply line from India was reached.

With the British were Chinese forces under Lt.-Gen. Stilwell, U.S. chief of staff to Chiang Kai-shek. Slim, in the centre, moved N. towards Mandalay, the Irawadi, and the Chindwin. Parallel with him, Stilwell also came N. along the Sittang valley. With the armed forces went 100,000 refugees, many of whom died on the way from privation.

There was no bridge across the Chindwin in those days, and the piled-up tanks, Bofors, and field guns which 3½ years later still littered the E. bank of the Chindwin told their own story of the last fierce engagement of 1942.

The Japanese had thrust up the Chindwin to cut off the retreating forces. Everything likely to be of value to them was destroyed; then the British crossed the Chindwin by night in native boats and marched the 200 m. into India, evacuating Burma on May 15 to take up positions along India's jungle frontier. Why the Japanese did not immediately invade India is puzzling; but in the lull which followed General Wavell, then c.-in-c. India, and Stilwell trained and re-grouped their forces.

HOLDING AND PREPARATION. The monsoon (May-Oct.) prevented movement by either side until the end of 1942. By then Wavell had prepared a limited offensive along Burma's west coastal strip called Arakan, with Akyab as the goal. This strip is isolated from central Burma by a high mountain and jungle chain,

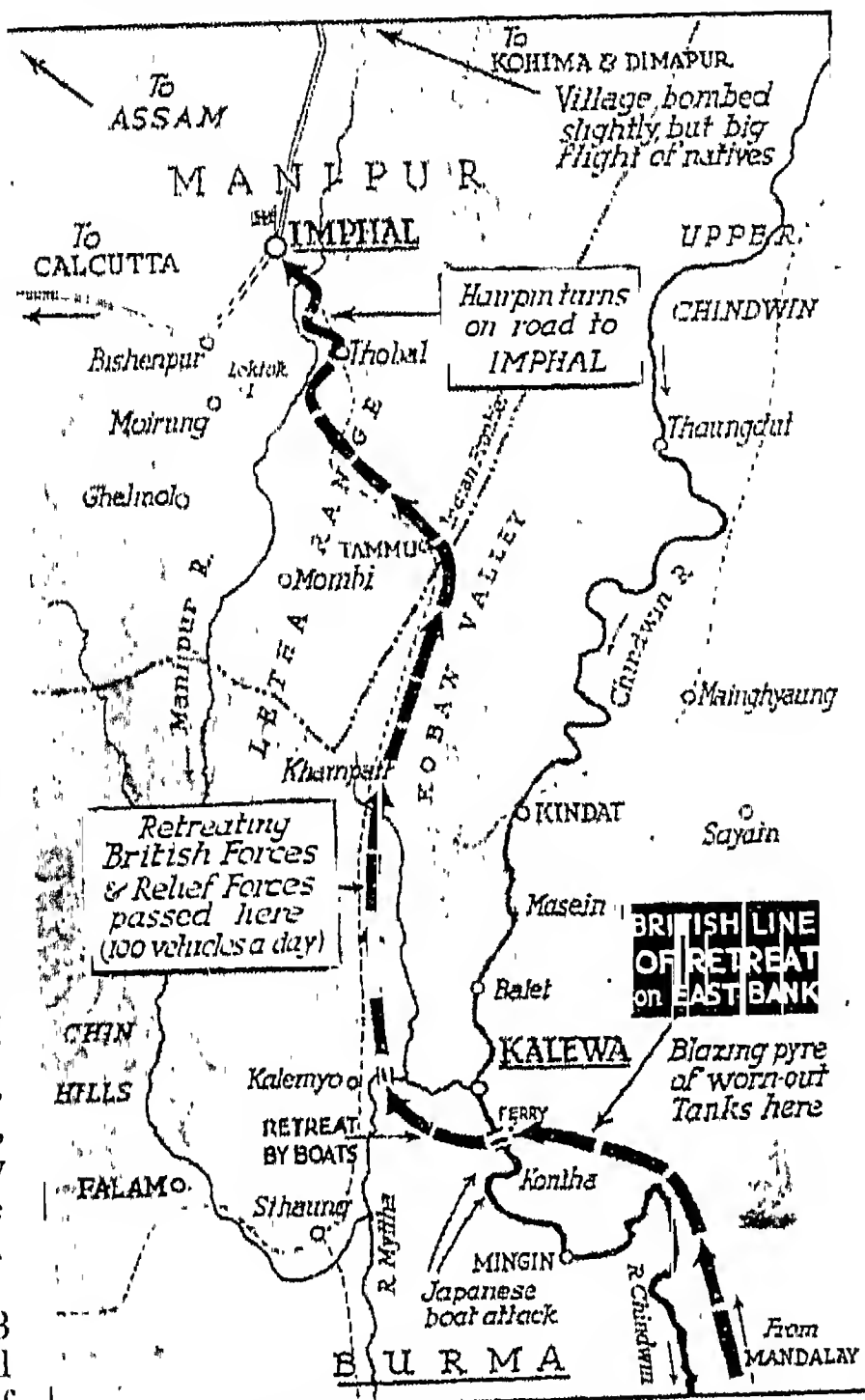
which runs parallel to the coast 15-20 m. inland. The port of Akyab would be a valuable prize should our armies come back later into Burma through the mountain passes. Furthermore a victory was needed to give the men confidence. Above all, however, the coastal strip approach to India—the easy invasion route for the enemy—must be sealed.

In the fine weather at the end of 1942, therefore, Wavell struck in Arakan. The main British-Indian force advanced well at first, and made progress down the Mayu peninsula, aided by support from the sea. Eventually, however, it was halted by stronger Japanese forces and compelled to retire.

Meanwhile the 1943 monsoon began, and took a heavy toll of the troops. The Japanese counter-attacked, made outflanking movements, and made the whole Allied forces withdraw to prevent isolation. The British attack had failed for lack of training and, in some respects, for lack of equipment.

Wingate's Chindits

This defeat did not heighten the morale of the Allied forces—but what did cheer them was a demonstration in central Burma of the fact that the Japanese could be beaten in these Burmese jungles. There, Brig. O. C. Wingate was leading his first Chindit expedition deep into Burma—destroying, fighting, and obstructing behind the enemy lines. It is said that the confusion which this small expedition of 3,000 men created in Burma prevented the enemy from launching a big offensive in 1943. Wingate proved that the British could fight in the jungle; and morale was raised abundantly. His casualties were high (33 p.c.); but his thousand-mile trek caught the imagination of the world and set a new spirit abroad in the Far East. More important still, the 1943 Wingate "footslogging" expedition paved the way for the vital airborne one of 1944; and



Burma Campaign. Retreat of Gen. Alexander and his troops. They crossed the Chindwin south of Kalewa, and by May 15, 1942, were back in India
By courtesy of "The Sphere"

it brought out that principle of air supply which was to reshape the whole strategy.

By May 20, 1943, early in the same monsoon that caught Wavell in Arakan, Wingate's survivors were back; while farther N. Stilwell, with his now reinforced Chinese, had begun in Dec., 1942, to drive his way back to besieged China, by building across terrible jungle the great Ledo Road from India into N.E. Burma to link with the old Burma-China road near Bhamo.

Into this scene of all-round preparation in August, 1943, stepped Lord Louis Mountbatten, supreme Allied commander of the new South-East Asia Command. His arrival stirred the whole front. Mountbatten's orders were as clear as Alexander's had been in Egypt, and had come from the same terse pen: 1, to reopen a land route to China; 2, to retake Burma; 3, to prepare to retake Singapore.

Stilwell was to push on with his Ledo Road project, aided by an airborne Wingate expedition dropped behind the Japanese. Burma was to be retaken by an

amphibious operation directed at Rangoon, thus cutting off all Japanese forces in central Burma. Singapore was to be tackled in the same way.

But first must come all the equipment—already promised; the landing craft, the combat and transport aircraft and gliders; the reinforcements at sea and on land. It was now that Mountbatten had his big—and to a lesser man, crippling—disappointment. The amphibious equipment was not sent, as it was needed for Italy. He would have to wage a predominantly land war throughout a campaign which was best suited to combined operations.

At the beginning of 1944 Mountbatten had the following forces under command: the new 14th Army (Slim), consisting of the 4th, 15th, and 33rd Indian corps; Stilwell's Chinese forces; Eastern Air Command, consisting of R.A.F. squadrons and the former 10th U.S.A.A.F.; the East Indies Fleet (Adm. Sir A. Power). There were also some special units, notably Wingate's Chindit division, some marines, and Wingate's air force, an American expedition under Col. Cochran.

Mountbatten decided to go ahead with items one and two of his orders, and his plan for the recapture of Burma had to be the "impossible" one, through the jungle, over the mountains, and down the rivers to Rangoon, nearly 1,000 m. away, without a land line of communication. It might, however, be done in fine weather and by living on air supply for the whole advance.

The Japanese Strike Again

Meanwhile the Japanese—scenting danger—struck hard in two places: first the Arakan, and later over the Chindwin to the central Burma front. The second was the attack they should have made a year earlier. The first was a sudden reaction to a second British push designed to retake Akyab. This port was now vital to the whole Burma scheme, as, on an air-supply basis, the lack of roads from it into central Burma no longer mattered. What did matter was that it had good airfields alongside the port, and, from supply dumps built up there, the main body of the 14th army could be nurtured by air nearly to Rangoon itself.

The original British offensive was made by Lt.-Gen. Christison's 15th corps, and he planned a three-pronged drive on Akyab;

the 5th Indian division going down the coastal strip, the 7th Indian division on the E. side of the Mayu hills, and the 81st W. African division down the Kaladan valley to guard the jungle flank. This advance made good initial progress and the 15th corps was on the verge of capturing the only E.-W. road in Arakan, which runs from Maungdaw to Buthidaung.

The Japanese reacted violently. They sent a force filtering through the jungle between the 7th Indian and the 81st (W.A.) divisions and surrounded the 7th in the Mayu valley. They mounted artillery on top of the Mayu hills and even brought under fire the 5th division's coastal road up to Chittagong. They expected that the encircled 7th and the threatened 5th would immediately withdraw and would be decimated by enfilading fire. Neither of the Allied divisions moved, but went into an all-round defence and relied upon the new weapon of air supply to keep them going. For twenty days the battle raged, supplied entirely by air. For the first time, too, the British had air supremacy and the enemy air force hardly made an appearance.

Fourteenth Army's First Victory

Meanwhile the 26th Indian division and the British 36th division were sent down from the N. to raise the siege, and the enemy were caught between the hammer and the anvil. Eventually they were forced to retire, leaving 7,000 dead on the field.

This big defensive victory was the first defeat inflicted on the Japanese by the 14th army and raised the morale of the forces in SEAC to an enormous extent. Immediately after the battle the 15th corps pushed on towards Akyab, but unfortunately could not exploit its victory to the full because the 5th and 7th divisions shortly afterwards had to be flown from Arakan to play their part in the vital battle of Imphal.

As the Arakan battle died away in the hills, the main enemy assault was launched on the central front. To realize the full importance of this great Japanese gamble, it must be remembered that, just as it began, Stilwell was making progress on his Ledo Road drive in the N.E. If he succeeded, the isolation of China would be broken and a strategic reshaping would follow. Furthermore, Wingate had just flown in his second Chin-dit expedition, landing between Myitkyina and Mogaung, and had three brigades operating to assist

Stilwell by cutting the Japanese line of communication to their northern troops. The stakes on both sides were big when, on March 17, 1944, the Japanese launched 100,000 troops over the Chindwin to invade India by way of Tiddim, Kohima, and Imphal.

They had two immediate tactical objectives: one, to surround and annihilate the 4th corps on the Imphal plain; two, to cut the Bengal-Assam rly. at Dimapur. If both these objectives were secured the Japanese were convinced that the road to India would be open and China cut off.

General Slim had foreseen such a Japanese attack, and decided to withdraw his forces into the Imphal plain, thus shortening his own communications and lengthening those of the Japanese. Everything depended on Imphal's holding out. To reinforce this front, Mountbatten flew two infantry divisions (the 5th and 7th Indian) from Arakan—the first time that whole infantry divisions had been moved by air. The tide of Japanese invasion swept up to the Imphal plain and against the bastion of Kohima to the N. The enemy used three divisions in this attack, which carried them over the Indian border to within 20 m. of the vital Bengal-Assam rly. British forces in mountain-ringed Imphal were now cut off. Kohima was a possible weak spot in the Allied defence plan, for there a

mixed garrison of 3,500 men faced the onslaught of the Japanese 31st division. For fourteen days it held out, supplied by parachute, in one of the bloodiest battles of the whole war. It was relieved on April 24, although the Japanese were not cleared from it until May 14.

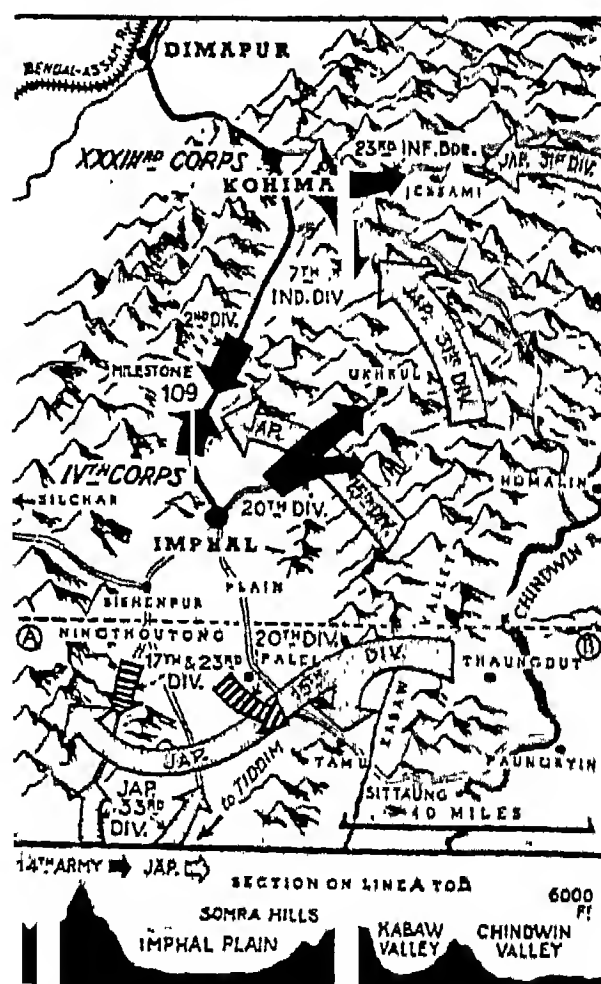
Imphal, although completely surrounded, fought on for three months until on June 22 men of the 4th corps, forcing their way N. from Imphal, met men of the 33rd, advancing from Kohima.

The British defensive success in March-June, 1944, laid the whole foundation of the Burma victory. The battles had been furious. Kohima was an Arnhem which lasted twice as long, but which was won. As the starving Japanese reeled back disorganized into the jungle, Mountbatten and Slim took stock of the position.

Success on the N.E. Battle Front

In the N.E., Stilwell had captured Mogaung. He was to take Myitkyina on Aug. 4, and reach Bhamo in Nov.; he had linked up with the Chindits (now, after the death of Wingate, under Maj.-Gen. Lemaigre). Japanese resistance was weaker, and Chiang Kai-shek had dispatched forces from his side to help complete the India-China link-up. Item one of the undertaking was making good progress. In the centre the Japanese were disorganized and starving. In Arakan the first fine weather (Nov.) would see the 15th corps on the move, this time with Akyab an assured prize ripe for the taking. In the air, Eastern Air Command had complete monopoly and valuable air supply lessons had been learned. On the debit side, the monsoon had started; the country ahead was frightening; Rangoon was still nearly 1,000 m. away.

There were hectic and vital conferences, but the final decision suited the mood of the front. It was to chase the enemy through the monsoon, on to the Chindwin. It was a great opportunity. The enemy was short of everything, it seemed, except ammunition. The East Africans took again the road through the dreaded Kabaw valley, while the veterans of the 5th Indian division pursued the enemy across the jungle tracks of the Chin Hills and down the road through Tiddim. This village the Japanese had quit, to stand and fight farther down the road. With the 5th division came tanks. They were winched up the steep slopes, and on the level were carried by lorries whose



Burma Campaign. Map showing Japanese invasion of India in the spring of 1944. Shaded arrows indicate direction of enemy's thrusts; black arrows, movements of British forces in same area

drivers accomplished miracles in negotiating the bends and turns of the precipitous road. The tanks had their part to play at the feature called the Chocolate Staircase, where the Japanese tried hard to make a stand; also at Kennedy Peak, a 9,000-ft. mountain with many strongpoints, where the tanks were taken up the slopes to blast the enemy out of their holes at point-blank range.

On Nov. 14 an Askari of the 11th East African division met a Sepoy of the 5th Indian division on the track that runs along the bank of the Myittha river from Kalemyo to the Chindwin at Kalewa. Kalemyo falling on Nov. 16.

On this track the Japanese were expected to stand firm, for there are defiles in which a handful of men could hold up an army. But for some reason the enemy failed. The East Africans reached Kalewa and established a solid bridgehead on the E. bank of the Chindwin. The second great obstacle on the march back was overcome.

Holding the Chindwin Bridgehead

From the East Africans, the British 2nd division took over the rôle of holding the Chindwin bridgehead. Already the engineers had laid across the great river a pontoon-mounted Bailey bridge, 365 yards long (*see* Chindwin). Traffic was pouring across it night and day.

For the first time for months the Japanese air force responded to the challenge: five aircraft came over to put out of action this vital link in communications, but scored not a single hit on the bridge. The bridgehead was expanded, and the 2nd division, under Maj.-Gen. Nicholson, began to take the long road to Mandalay.

Jan., 1945, was the time of great moment. The British were across the Chindwin. The monsoon was over and its horrors of mud and jungle defeated. Ahead was the mercifully clear and open plain of central Burma with its rivers and roads stretching S. to Rangoon. There were three clear months of fine weather, and the aircraft for the world's biggest effort of air supply were standing ready. In Arakan, the 15th corps had moved surely on to vital Akyab, and was heading for Ramree Island, from whose port-side airfields Dakota planes could bring water and supplies to the 14th army all the way to Rangoon.

There was one danger; if the army failed to reach Rangoon by early May, there would follow a disaster, for in the rains the air



Burma Campaign. While the Japanese were attempting to invade India from W. Burma, Stilwell's forces (black arrows) from N.E. and airborne Chindits (shaded arrows) from centre were closing in on Mogaung; Chindit landing strips named in italics

supply line would not be available. Land communications 2,000 m. long to Calcutta could never hope to supply Slim's forces in the rains. Once launched, Slim's forces were embarked on a fixed course of "Rangoon Before the Monsoon"—700 m. in 3 months. Failure in this might set the SEAC war back by two years. It was decided, however, that the opportunity was too big to be lost.

From the N.E., too, came the cheering news that Stilwell had driven his own road back and was through to China. The great oil pipe line was not far behind the troops, and the siege of China was raised. After three years of dependence upon airborne supplies over the rugged hump of the Himalayas, the U.S. 14th A.A.F., stationed in China, now had a land link again with the Allies. Amid these happy omens the 4th and the 33rd corps went in to the great attack in Jan., 1945.

Three divisions (2nd British and 19th and 20th Indian) poured out on to the N. Burma plain and enveloped Mandalay. This involved major crossings of the Irawadi by each of the divisions.

at places where the river was three to four times as wide as the Rhine. The crossings were made, as Slim later said, "on a shoe string and a bit of bamboo," but they were made, and all bridge-heads held against furious opposition. Gradually the Japanese were forced back, and day and night they were pounded from the air. Meanwhile from the Arakan ports poured the loaded Dakotas, landing in central Burma on rough-hewn dirt strips, unloading, and turning back again for more. At the peak of air supply (March, 1945) these R.A.F., R.C.A.F., and U.S.A.A.F. Dakotas were flying 100,000 tons of men and equipment a month to the battle areas. Something like 200 rough airstrips were built, used, and abandoned in the campaign.

Under the powerful air umbrella of Eastern Air Command, Slim took Mandalay on March 20, and thus completed the necessary clearance of N. Burma before starting on the dramatic dash south. Five weeks to go—and 450 miles to Rangoon. The Japanese drew up the remnants of their three armies below Mandalay to bar the road. Slim then delivered his decisive blow of the campaign. Three divisions of the 4th corps (5th, 7th and 17th Indian) secretly crossed the Irrawadi at Pagan and Pakokku, and the 17th made an 80-mile armoured dash across desert country to Meiktila, the key Japanese communication centre behind their lines. Meiktila fell Feb. 28, after a week of fierce battles, and the main Japanese forces thus had Slim's army both to N. and to S. They were crushed together, and thousands were killed.

Final Dash to Rangoon

This was the vital battle. In the first week of April, the 5th and 17th divisions set out from Meiktila on the final dash to Rangoon. By using motorised brigades to the full, they made astounding progress. Toungoo, half-way mark, was reached by April 26. By April 30 the British were at Pegu, 47 m. N. of Rangoon. It was here that the monsoon rains began. Mountbatten had foreseen that the rains might catch the offensive in its final stages and had an amphibious and airborne invasion ready. This was launched by the 15th corps on May 2, and Rangoon fell with virtually no opposition. Its garrison had moved N. to defend Pegu.

The fall of Rangoon was virtually the end of the Burma cam-

paign for, during the dash down from Meiktila, the 33rd corps had cleared the oilfields around Yenangyaung, and had turned S. down the Irawadi through Prome towards Rangoon, helped by the Burma national army. About 50,000 Japanese remained in isolated pockets or in the Shan Hills. Many attempted to withdraw through the Allied lines, and there was furious fighting, particularly on the Sittang bend and on the Toungoo-Mawchi road. In one of these engagements 11,000 Japanese were killed for an Allied loss of 73. When the Japanese surrendered, the SEAC total of their counted dead had reached 120,000; 42 p.c. of the total Japanese army killed in the whole Far East war. At the time of the surrender in Aug., SEAC was about to launch a great sea and air invasion of Malaya and Singapore.

Thus ended one of the most amazing campaigns of the war. An advance of nearly 700 m. in three months was effected—all on a basis of air supply. On the ground the 14th army, aided by marines and by the little ships of the R.N. and the Royal Indian Navy, had overcome "impossible" obstacles of terrain, jungle, and swamp. Great imagination, as well as fortitude and skill, had helped in that campaign. *Consult Report on Operations in S.E. Asia, 1943-45*, Earl Mountbatten, 1951; *Defeat into Victory*, Sir William Slim, 1956.

Burma Frontier Force. Military force set up in Burma in 1937 when the government of India ceased to be responsible for Burma's military administration. Being Buddhists, the majority of Burmese do not take kindly to soldiering; consequently, the new force had to enlist its native personnel from amongst the Kachins, Karens, and Chins—hardy hill tribes with a long military tradition. There already existed in Burma for frontier patrol a small but competent body of police called the Burma Frontier Force, which was recruited from such native Burmese whose religion permitted them to bear arms. Officers of both forces were seconded from the British and Indian armies. In 1939 Burmese defence forces were amalgamated and brought under the Far Eastern high command.

Burmans, PETER (1668-1741). Dutch classical scholar. He was born at Utrecht and educated at Leyden and Utrecht universities, at both of which he held professor-

ships. His chief works are editions of the Latin classics, containing the notes of various commentators loosely put together, which, although full of useful information, are of little value as critical editions. He also wrote on Roman taxes and revenues, and published a collection of the letters of distinguished scholars.

Burma Road. The military road from Lashio, Burma, to Kunming (Yunnanfu), China. Construction of a road from Burma to China was suggested in 1860 and provisional routes were surveyed by Col. T. B. Sladen in 1868, A. R. Margery in 1874, and by Maj. H. Davies in 1895 and 1900. The eastern section of the road, from Hsiakwan (Tali) to Kunming, already existed in a primitive form at the outbreak of the China-Japan conflict in 1937, but with the rapid loss of her ports, it became obvious to China that she would have to draw her main war supplies overland from Indo-China and Burma.

Early in 1938 the Chinese government began construction of the road to Burma, and the 726 miles of highway, including the widening and resurfacing of the Hsiakwan-Kunming section,



Burma Road. Map showing its whole extent from Lashio in Burma to Chungking
By courtesy of "The Times"

was completed by Dec., 1938. Traversing the mountainous province of Yunnan, the Burma Road is an outstanding engineering achievement. It was built entirely without modern road-making machinery, and all the levelling of the road-bed and cutting of the rocks was done by hand, over 1,000,000 men, women, and children being employed on the work. The average height of the road is 4,000 ft. above sea level, but in places it climbs to 9,000 ft. There are 288 bridges, the longest two being those across the Mekong and Salween rivers, and 1,959 culverts to carry away mountain waters. The average width of the road is 12 ft., but the steep gradients and numerous hairpin bends restrict traffic to an average of 12 m.p.h., the journey by motor lorry from Lashio to Kunming occupying seven days. From Kunming the road continues to Chungking, about 1,600 miles in all.

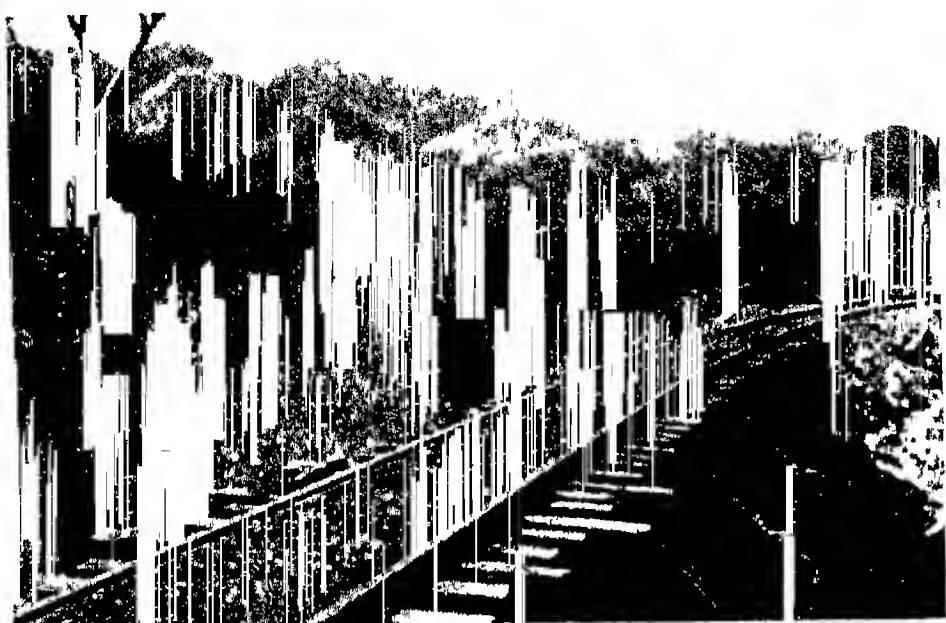
Hankow fell in Oct., 1938, leaving no link between China and the West until completion of the road in Dec. A daily average of 100 lorries used the road, taking petrol, munitions, cotton yarn, etc., to China, and returning with tin, silk, hides, and tungsten. On July 18, 1940, the Burma section was closed at the request of the Japanese government. Great Britain was then expecting a German invasion and could not risk offending the Japanese. The road was opened three months later, and fleets of lorries and hundreds of



Burma Road. Photograph taken from a banking aeroplane, showing transport on a mountain section of the road

pack animals left Lashio for China. Despite constant bombing by Japanese aircraft operating from bases in Indo-China, traffic was seldom interrupted. In April, 1942, Lashio was captured by the Japanese, and the Burma Road ceased to provide a link with Free China until the Japanese were driven from Burma in 1945. See Ledo Road.

Burma-Siam Railway. Chord line from Bampony, 54 m. W. of Bangkok, to Tana Besar, 30 m. S. of Moulmein, a distance of 282 m., connecting the Siam and Burma rly. systems. The route had been surveyed by British engineers in 1910, and two years later work started from both ends, but had to be abandoned because the country was so unhealthy. Follow-



Burma-Siam Railway. Stretch of the notorious line built by the forced labour of British and Allied prisoners-of-war

Photo, "The Times"

ing their occupation of Burma, in 1942, the Japanese decided to build the line as a necessary improvement on a motor road, impassable in wet weather, and several jungle tracks.

Work on the line started in Oct., 1942, and the rly. was completed in Oct., 1943. Some 54,000 British, Australian, U.S., and Dutch prisoners, and 100,000 coolies conscripted from China, Burma, Siam, and Java, did the work in slave conditions of the most pitiless kind; more than 13,000 whites and some 50,000 coloured labourers died. The R.A.F. destroyed the 300-ft. long Nagorn-Chaisri bridge 30 m. W. of Bangkok, Jan. 3, 1945. The part of the rly. from Bangkok to the Burma border S. of Moulmein was sold by the Allies to Siam for £1½ millions, Oct. 7, 1946.

Burma Star. Award granted to those taking part in the Burma campaign from Dec. 11, 1941. The institution of this award was announced May 18, 1945. The ribbon (designed by King George VI) is dark blue with a central red stripe and two orange stripes. The

design of the medal is similar to that of the other campaign stars of the Second Great War. See Campaign Stars.

Burmese Wars. Three wars waged by the British in Burma. The first began in 1824 and lasted for nearly two years. In Sept., 1823, the Burmans had attacked the British at Shapura, and early in the following Jan. they invaded Cachar, then under British protection. War was declared March 5, 1824, and a force under Sir Archibald Campbell captured Rangoon in May, but fighting continued until March, 1825. Negotiations ensued, but war continued until after the fall of King Pagan in Feb., 1826, the Burmans renouncing all claims on Assam, ceding the provinces of Arakan, Mergui, Tavoy, and Ye, and paying an indemnity.

The second war, in 1852, was much shorter. On April 12 British troops under General Goodwin captured Rangoon, on June 3 Pegu, and Prome in Oct. In Jan., 1853, peace was made, and Lower Burma was annexed by the British.

The third war broke out in consequence of the aggressive attitude of the Burmans, under their king Theebaw or Thibaw, whose capital was at Mandalay. A British force of 9,000 men, 2,800 followers, and 67 guns, under General Prendergast, was organized in Oct., 1885, and taken up the Irawadi in steamers. Before the end of Nov. Mandalay was captured and King Theebaw made prisoner. Part of the force advanced to Bhamo, and occupied it on Dec. 26, thus forestalling the Chinese, who had designed to seize it. On Jan. 1, 1886, Upper Burma was annexed.

Large numbers of the Burmans who had been fighting the British maintained a guerrilla warfare for years. This dacoity was finally suppressed by Roberts.

Burn. Anglo-Saxon name for a rivulet, brook, or stream. It is frequently found in British place and river names N. of the Tees, e.g. Bannockburn, Broxburn, Otterburn, Bishop Burn.

Burnaby, GEORGE DAVY (1881-1949). British comedian. Born at Buckland, Herts, April 7, 1881, he

secured an engagement with Mrs. Langtry, with whom he toured the U.S.A., in 1902. After playing for 20 years in England and the U.S.A., he became an original member of the famous Co-Optimists team, 1921, and remained six years as well as rejoining for revivals up to 1935. Davy Burnaby, whose style was genial absurdity, wrote much of the Co-Optimists' repertoire. He died April 17, 1949.

Burnaby, FREDERICK GUSTAVUS (1842-85). British traveller and soldier. Born March 3, 1842, at Bedford and educated at Harrow he entered the Royal Horse Guards in 1859, and became colonel of his regiment in 1881. Of enormous physical strength and an expert linguist, he varied his military career with frequent periods of travel. In 1875 he conceived the idea of penetrating Central Asia, access to which was denied by the Russians to Europeans, and his well-known book, *A Ride to Khiva*, 1876, contains an account of his 300-mile ride across the frozen steppes. A journey through Asia Minor and Armenia followed in 1876, after which Burnaby attached himself to the Turkish forces in the Russo-Turkish War. Returning to England, he unsuccessfully contested Birmingham as a Conservative in 1880. He was killed by a spear at Abu Klea, Jan. 17, 1885. Consult *Life*, J. Ware and R. Mann, 1885.

Burnand, SIR FRANCIS COWLEY (1836-1917). British humorist and dramatist. Born in London, Nov. 29, 1836, he was educated at Eton and Trinity College, Cambridge. He studied for the Church of England, but on becoming an R.C. he read law and was called to the bar. In 1863



F. C. Burnand

Russell

he made his first contribution to *Punch*, of which he was editor, 1880-1906. His most popular contribution to *Punch* was his series of *Happy Thoughts*. Of his stage burlesques and light comedies, *Black-Eyed Susan* and *The Colonel* were the most successful; and he collaborated with Sullivan in *Cox and Box*, 1867. He wrote one novel, *My Time and What I've done with It*, 1874; and his memoirs appeared as *Records and Reminiscences* in 1904. Knighted 1902, he died April 21, 1917.



Fred. Hollyer

E. Burne-Jones

Burne-Jones, Sir Edward Coley, Bart. (1833-98). British artist. Born Aug. 28, 1833, at Birmingham, he was christened Edward Coley Burne. His father was Edward Richard Jones and his mother's maiden name was Coley. He was educated at King Edward's School, Birmingham, and Exeter College, Oxford. His first idea was to become a clergyman; then he thought of entering the army, but having entered the university, he soon turned definitely to art and literature.

At Oxford he and his intimate friend William Morris, with some kindred spirits, formed a little group called The Brotherhood. The sight of some pictures by Rossetti and others of the Pre-Raphaelite Brotherhood made Burne-Jones eager to become acquainted with Rossetti. He came under his influence in 1855, and at his suggestion left the university and began his career as an artist, first in Rossetti's studio, and later under his constant guidance. In 1859 he visited Italy, and in 1860 married Georgiana Macdonald, daughter of a Wesleyan minister. One of her sisters married Lockwood Kipling, father of Rudyard Kipling.

Working first in water colour, he became an Associate of the Royal Society of Painters in Water Colours in 1863. He took up his residence at the Grange, North End Road, Fulham, in 1869, and continued to live there until his death. The opening of the Grosvenor Gallery in 1877 first brought him into public notice. It contained many of his pictures, which, by reason of their appeal in colouring, symbolism, and draughtsmanship, were accepted with the greatest enthusiasm, even

though it was recognized that in many cases they disturbed old prejudices. There was, moreover, a special appeal to the literary public in Burne-Jones's pictures, which represented "a poetical and unconventional art." From 1877 his career was one of ever-increasing success. He was the foremost draughtsman of the day, delighting in intricate line, and at the same time a profound student of full rich colour. If he learned anything special from Italian art, it was from the paintings of Botticelli.

His works, though always somewhat melancholy and limited in range, are remarkable for their quality of imagination, for their wealth of accessories, for their exquisite draughtsmanship, and for their refined and delicate colour. Pictures such as *Merlin and Vivien*, the series called *The Briar Rose*, *The Golden Stairs*, *The Wheel of Fortune*, *The Depths of the Sea*, *The Merciful Knight*, *The Mirror of Venus*, and *Love Among the Ruins*.

are perfect works of decoration, combined with extraordinary poetic sentiment and fine literary association. Burne-Jones also devoted much time to the preparation of cartoons for stained glass windows, as a rule carried out by his old friend William Morris, for whom he also prepared numerous illustrations for books published by the Kelmscott Press, notably for the Morris edition of Chaucer.

Not at first regarded as a painter of great genius, Burne-Jones had a marvellous capacity for taking pains, and, beginning his career as an artist comparatively late in life, he worked with unceasing perseverance to express the visions, poetic and imaginative, which filled his mind. It has been well said that his characteristics were "an infallible sense of beauty, form, and

colour, a powerful and overwhelming originality, and an unequalled grace and delicacy of fancy." Elected A.R.A. in 1885, he sent only one picture, *The Depths of the Sea*, to the Royal Academy, and resigned in 1893.

A baronetcy was conferred upon him in 1894. He died June 17, 1898, and was buried at Rottingdean, near Brighton.

Bibliography. Sir E. Burne-Jones: a Record and a Review, Malcolm Bell, 4th ed. 1898; Life, by his widow, 1904; Five Great Painters of the Victorian Era, W. Bayliss, 2nd ed. 1904; Burne-Jones, J. E. Phythian, 1908; Biographical Study, Malcolm Bell, 1909; The Charm of Burne-Jones, S. L. Bensusan, 1911.

Burnes, Sir Alexander (1805-41). British explorer and Indian official. Born at Montrose, Scotland, May 16, 1805 and related on his father's side to the poet Robert Burns, he joined the Indian army in 1821, and in 1829 was appointed assistant resident in Cutch. After extensive exploration in India,



Burne-Jones. *The Wheel of Fortune*, exhibited in the Grosvenor Gallery in 1883. A characteristic painting by this pre-Raphaelite artist

Afghanistan, Bukhara, and Persia in 1831 and 1832, he returned to England and published an account of his travels. In 1836 he was sent on a mission to Dost Mahomed, ameer of Afghanistan, and in 1839, after being knighted, accompanied the military expedition to Kabul as political officer. He was killed in the Afghan rising, Nov. 2, 1841.

Burnet (*Poterium sanguisorba*). Perennial rosaceous herb with a rosette of long leaves which are divided into from five to ten pairs of stalked, coarsely toothed, oblong leaflets, which give out the odour of cucumber when bruised. The flowering stems grow to a height of 2 ft. and bear rounded heads of small purplish flowers. A native of poor chalky soil, it is included in some of the mixtures used for permanent pasture, e.g. Cambridge mixture for poor clay soils and Elliott's mixture.

Burnet, GILBERT (1643–1715). British historian and prelate. Born at Edinburgh, Sept. 18, 1643, he was a son of Robert Burnet, lawyer and Episcopalian, his mother being a Presbyterian. Educated at Marischal College, Aberdeen, he forsook the study of law for divinity and history, spent a few months at Oxford and Cambridge, and studied Hebrew at Amsterdam. In 1665 he became parish minister at Saltoun, and in 1669 was appointed divinity professor at Glasgow. Accepting episcopacy, his broad-church views pleased neither the Presbyterians nor the bishops, and in 1674 he settled in London as chaplain to Charles II, and in 1675 was made preacher at the Rolls Chapel and lecturer at S. Clement's.

A staunch Whig, he declined the sees of Edinburgh, Chichester, and Durham from Charles II. For his defence of William, Lord Russell, Burnet was deprived of his chaplaincy and lectureship, and on the accession of James II he retired to the Continent. Invited to The Hague, 1687, he won the favour of William of Orange and was associated with the preliminaries to the invasion of 1688. He was made bishop of Salisbury in 1689. He had charge of the succession bill of 1701, and in Anne's reign secured for the Church of England the funds afterwards called Queen Anne's Bounty (*q.v.*). He retained his influence under Anne and died March 7, 1715.

Burnet's best work, the *History of My Own Time*, pub. 1723–34, if

partisan and often inaccurate, is still invaluable. It was edited by O. Airy, 1897–1900; supplement, ed. H. C. Foxcroft, 1902. The *History of the Reformation of the Church of England, 1679–1715*, ed. N. Pocock, 1865, is less trustworthy. His other writings include a *Vindication of the Authority, Constitution, and Laws of the Church and State of Scotland*, 1673. *Consult Life*, T. E. S. Clarke and H. C. Foxcroft, 1907.

Burnet, JOHN (1784–1868). British engraver and painter, best known for his engravings of Wilkie's pictures. Born at Musselburgh, March 20, 1784, he was apprenticed to an engraver at Edinburgh, and studied art at the 'Trustees' Academy. In 1806 he moved to London, in 1813 to Paris, where he produced several plates after Rembrandt and Gabriel Metsu. His chief work as a painter was *The Greenwich Pensioners*. He died April 20, 1868.

Burnet, SIR JOHN JAMES (1859–1938). British architect, designer of the Cavalry war memorial at Hyde Park Corner, London. Born at Glasgow, May 31, 1857, the son of an architect, he was educated at the Western Academy, Glasgow, and trained at the École des Beaux Arts, Paris. After a period of travel abroad, he created a large practice in Scotland. In 1905 he moved to London, having been appointed in 1904 architect for the new Edward VII galleries of the British Museum, on the completion of which in 1914 he was knighted. He was responsible for several large commercial buildings in London, notably Adelaide House, London Bridge, 1921–24; and designed other war memorials besides that at Hyde Park, e.g. the Glasgow cenotaph and the Indian war memorial on the Gulf of Suez. He died at Colinton, Edinburgh, July 2, 1938.

Burnet Moth. One of a group of moths, of which seven species are recognized as British, the six-spot burnet (*Zygaena filipendula*) being the best known. They all have dark blue or green fore-wings, usually spotted with red, and red hind-wings, and are found in meadows and open spaces in woods.

Burnett, FRANCES (ELIZA) HODGSON (1849–1924). British-born American author. She was born at Manchester Nov. 24, 1849, the daughter of Edwin Hodgson. She went with her parents to the U.S.A. in 1865, and published her earliest story in 1867. In 1873 she married Dr. Burnett, of Washington, whom she divorced in 1898.

Mrs. Burnett graphically depicted Lancashire life in *That Lass o' Lowrie's*, 1877, her first success, and



Frances Hodgson Burnett, Anglo-American novelist

Haworth's, 1879; and described the American girl abroad in *A Fair Barbarian*, 1881, and *The Shuttle*, 1907. She described American life in her *Louisiana*, 1880,

and *Through One Administration*, 1883; and achieved great popularity with her sentimental story *Little Lord Fauntleroy*, 1886, the success of which as a play was almost as great. Her other works include *A Lady of Quality*, 1896, dramatised in collaboration with Stephen Townesend (d. 1914), who in 1900 became her second husband. Her play *Esmeralda*, 1882, ran for three years in the U.S.A. She died Oct. 29, 1924.

Burney, SIR CECIL (1858–1929). British sailor. Born May 15, 1858, the son of a naval officer, he was educated at the Royal Naval Academy, Gosport, and entered the navy in 1873. In 1882 he was on active service in Egypt, and afterwards in the Sudan.



Sir Cecil Burney, British sailor
West, Southsea

In the First Great War, in Dec., 1914, he was made second-in-command of the Grand Fleet, and leading its first battle squadron, took part in the battle of Jutland. He was on the *Marlborough*, but when that ship was damaged he transferred his flag to the *Revenge*. He was 2nd sea lord, 1916–17, and C.-in-C. on the E. coast of Scotland until 1919. Promoted admiral of the fleet, 1920, and created a baronet, 1921 he died June 5, 1929.

Burney, CHARLES (1726–1814). British musician. Born at Shrewsbury, April 12, 1726, he was educated and studied music at Chester and afterwards at Shrewsbury. He wrote some sonatas, the music to several dramas, gave lessons, and was a member of Dr. Johnson's literary circle. For nine years he was organist at King's Lynn, and in 1783 was made organist at Chelsea Hospital. He died in London, April 12, 1814. Burney is best known as the author of a

History of Music, 1776-89, and as the father of Fanny Burney (*v.i.*).

Burney, FANNY. The name by which the British novelist Frances Burney (1752-1840) is usually known. Born June 13, 1752, at King's Lynn, the daughter of Charles Burney, she educated herself in his library. In 1760 Burney moved his family to London. Fanny's first novel, written in the epistolary manner of Richardson, revived interest in the realistic story of everyday domestic life, and was hailed with enthusiasm by Dr. Johnson and his circle. Entitled *Evelina, or the History of a Young Lady's Entrance into the World*, it was published anonymously in 1778.

Of its successors, *Cecilia*, 1792, and *Camilla*, 1796, were very popular. The house called *Camilla Lacey*, Surrey, was built out of the profits of *Camilla*; it was destroyed by fire in 1919. During 1786-91 Fanny Burney was second keeper of robes to Queen Charlotte. She married a French *émigré*, General d'Arblay (*d.* 1818), in 1793, and died in London, Jan. 6, 1840. *Consult* Fanny Burney, Austin Dobson, 1903; *Diary and Letters*, ed. C. Barrett, 1904-05; ed. Masefield, 1931; *Life*, C. Lloyd, 1936.

Burnham, HARRY LAWSON WEBSTER LEVY LAWSON, VISCOUNT (1862-1933). British politician and newspaper proprietor. Born in London, Dec. 18, 1862, eldest son of the 1st Lord Burnham (*v.i.*), he was educated at Eton and Balliol College, Oxford. He was Liberal M.P. for W. St. Pancras, 1885-92, for Cirencester, 1893-95. He left the Liberals in 1905, on the Irish home rule issue, becoming Conservative M.P. for Tower Hamlets (Mile End division) 1905-06 and 1910-16. He was a member of the L.C.C. 1889-92 and 1897-1904. In 1903, on his father's elevation to the peerage, he succeeded to the proprietorship of *The Daily Telegraph*, which he sold in 1928 to Sir William Berry (later the 1st Viscount Camrose).

Succeeding his father as 2nd baron in 1916, Lord Burnham was created a viscount 1919. He presided over sundry public committees, including the I.L.O. (1921, 1922, 1926) and the first world's press conference, 1927. (*See also* Burnham Scale.) As a member of the Simon commission on Indian

affairs, he visited India, 1927-28. He died July 20, 1933, without an heir to the viscounty; his brother William Arnold Webster (1864-1943) succeeded as 3rd baron.

Burnham, EDWARD LEVY LAWSON, 1ST BARON (1833-1916). British journalist and newspaper proprietor. He was born in London, Dec. 28, 1833, eldest son of Joseph Moses Levy, who in 1855 started to print *The Daily Telegraph* and within a few months was its proprietor. Educated at University College School, Edward became in 1855 holder of a one-eighth share in this newspaper, and its editor. An able and enterprising jour-

nalist, he insisted on dramatisation (or at least humanisation) of the news, and would spend lavishly to make a story, as when, in conjunction with the *New York Herald*, he sent Stanley in search of Livingstone. A major success was an interview with the emperor William II of Germany which one of his friends obtained in 1908.

In due course Levy became chief proprietor of *The Daily Telegraph*. In 1875, by royal licence, he added the surname Lawson to his original name. In 1892 he was created a baronet, in 1903 a peer as Baron Burnham. He retired in 1904 and died Jan. 9, 1916. His eldest son, Harry, who was to become Viscount Burnham (*v.s.*) succeeded him as 2nd baron and as proprietor of *The Daily Telegraph*.

Edward Frederick Lawson (*b.* 1890), son of the 3rd baron and nephew of Viscount Burnham, succeeded as 4th baron in 1943; he continued, after the sale of *The Daily Telegraph* in 1928 to Lord Camrose, to be general manager of that paper, becoming later managing director.



Fanny Burney,
British novelist

Burnham Beeches. Picturesque sylvan tract in Buckinghamshire, England, lying between Slough and Beaconsfield. A remnant of an ancient forest, it was bought by the Corporation of London in 1879, and devoted to public use in 1883. The gift of an additional 70 acres by Lord Burnham in 1921 brought the area of the tract to 744 acres.

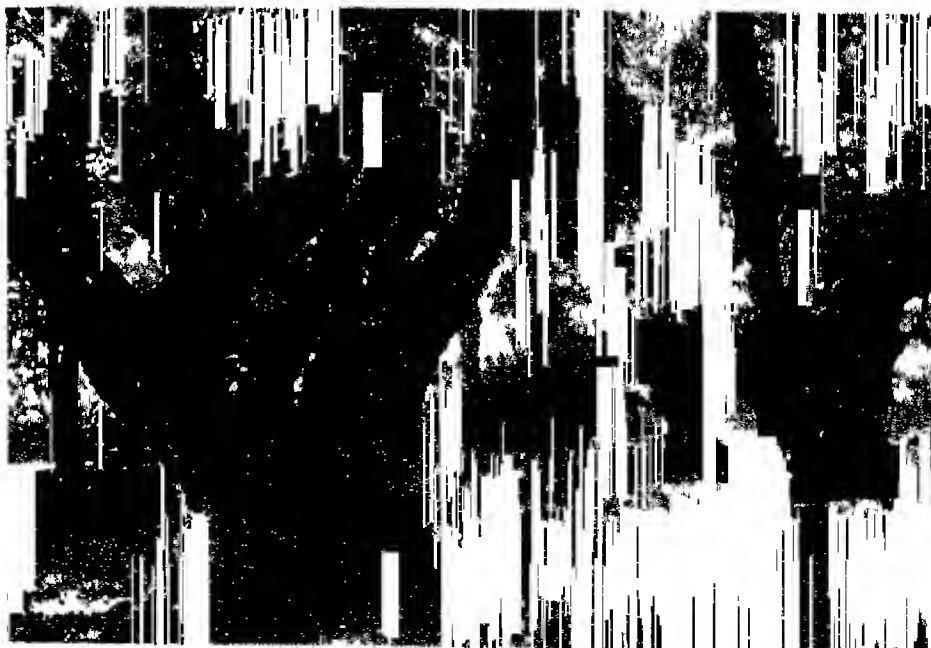
Burnham-on-Crouch. Urban dist. and resort of Essex, England. On the N. shore of the Crouch estuary, 42 m. E.N.E. of London, it is a yachting centre, and the building of yachts and boats is its main industry. Oyster cultivation is also important. Pop. (1951) 3,965.

Burnham-on-Sea. Urb. dist. and seaside and golfing resort of Somerset, England, on the estuary of the Parrett, 9 m. N. of Bridgwater. The church contains a white marble altar-piece by Inigo Jones, once in Westminster Abbey. Pop. (1951) 9,138.

Burnham Scale. Popular name for the system of arranging teachers' salaries introduced in England and Wales in 1919. The first negotiating committees were set up under the chairmanship of Viscount Burnham in 1919. They considered separately elementary, secondary, and technical schools; and their decisions became recommendations which authorities were pressed to accept. Reconstituted under the Education Act of 1944 to reflect stages of education rather than types, the committees were reduced to two: (1) a main committee, concerning itself with the salaries of teachers in primary and secondary schools and in county colleges; (2) a technical committee concerned with those in technical (including commercial and art) colleges and institutes maintained by a local authority; their decisions were made statutory. The first reports of the new committees, published in 1945, resulted in legislation fixing a new

scale, subject to review from time to time, for teachers' salaries in schools maintained by local authorities with state aid.

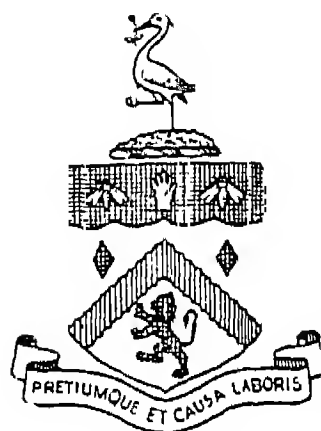
Burnie. Coast town and harbour of Tasmania, Australia. It is on Emu Bay, the port terminus of the Emu Bay railway, and is the centre of a pastoral and arable farming



Burnham Beeches, Buckinghamshire

district. Limestone is quarried near by; and there are sawmills and paper and cement factories. Pop. (1954) 11,119.

Burnley. Co. bor. and bor. constituency of Lancashire, England. It stands at the junction of



Burnley arms

the Brun with the Calder, 25 m. N. of Manchester, in a colliery district, and is a major centre of cotton weaving. As late as 1790 Burnley was a town of only 2,000 inhabitants. The con-

struction of the Leeds and Liverpool Canal, which almost encircles the town centre, stimulated expansion both of coalmining and of the textile industry. Other industries include the manufacture of textile machinery, wash boilers and washing machines, kitchenware, and light engineering products. There are also iron and brass foundries and breweries.

The ancient but much restored parish church of S. Peter contains several fine monuments, including one to Charles Towneley (1737-1805), whose collection of marbles is lodged in the British Museum. Modern buildings include a classical town hall, a central library, and Victoria hospital. Burnley has a grammar school founded in the reign of Edward VI, a technical college and school of art, and a museum and art gallery housed in Towneley Hall (built in the 14th and 15th centuries).

Incorporated in 1861, Burnley became a parl. bor. in 1867, and was created a co. bor. (extended in 1911 and 1925) in 1888. It is in the North East Lancashire development area. Market days, Mon. and Sat. Pop. (1951) 84,987.

Burnouf, Eugène (1801-52). French orientalist. Son of Jean Louis Burnouf (1775-1844), a distinguished classical scholar, he was born in Paris, Aug. 12, 1801. From 1832 until his death, May 28, 1852, he was professor of Sanskrit in the Collège de France. His principal works were an essay on Pali written with Christian Lassen, 1826; the deciphering of the Zend MSS. which A. H. Anquetil-Duperron had brought to France; *Commentaire sur le Yajna*, 1833-35, throwing much light on the language and doctrine of the Parsees; and a translation of the *Bhagavata-Purana*, 1840-47 (Indian mythology).

Burnous or **BURNOOSE** (Arab. *burnus*, hooded cloak). Loose, full cloak, worn by the Arabs. Usually white, it has a hood.

Burns. Injuries to the tissues caused by dry heat (the commonest type) or hot liquids or steam, when the term scald is applied. Burns may result from the action of chemicals, electricity, or X-ray, and may be classified according to their severity, ranging from reddening and blistering of the skin to complete charring.

The effects of a burn are both local and general. Where only redness and blistering obtain, the effects are almost entirely local, with little shock, unless a wide area is involved. If, however, there is partial destruction of the skin, leaving the sensitive cutaneous nerve-endings exposed, the pain is intense, and shock and collapse, a possible cause of death, ensue. If the burn destroys the whole skin-thickness, there is less shock. The area, however, will not heal by regeneration of skin, but only by the formation of scar-tissue, which later contracts and causes deformity, particularly on the flexor surface of limbs. It is for this type of burn that modern skin-grafting technique, which was brought to perfection during the Second Great War, revolutionised treatment.

The general effects of burns fall into four stages. First comes primary shock, with faintness, irregular action of the heart with feeble pulse, and shallow respirations. This condition itself is not serious, but it may usher in secondary shock, the second stage, in which there is loss of fluid from the blood-vessels into the tissues, with consequent thickening of the blood. This condition must be treated promptly by replacing the fluids by mouth, or, if necessary, intravenously. Thirdly, any time within four days, the next stage, toxæmia, may obtain, with vomiting, mental symptoms, and more marked circulatory failure. Fourthly, infection may gain a footing, possibly causing death from blood-poisoning.

The local effects of a moderately severe burn are chiefly redness, swelling from exudation into the tissues, and pain. This exudation must be treated at once if it occurs in an area such as the hand where the tissues are tense and there is little room for expansion. Treatment should be directed to drainage of the area by elevating it, and movements must be maintained at all costs.

In adults where 20 p.c. or more of the body surface is burned (in children 10 p.c.) shock is to be expected and should be treated with warmth, morphine, and fluids. Local treatment consists of cleansing the burn with white soap and water, gently and quickly, and then flushing the area with saline. Penicillin cream or 3 p.c. sulphathiazole cream on a layer of tulle gras is then applied and, after a severe burn, left on 7 to 10 days. A mild burn is re-dressed daily, and muscles and joints of the affected area are exercised. In severe burns early skin grafting shows very satisfactory results.

Burns, John (1858-1943). British politician. Born in London, Oct., 1858, he went to a national school in Battersea, and worked as a boy in a candle factory. He served an apprenticeship as an engineer, and for a time was in West Africa, but most of his working days



John Burns,
British politician
Russell

were spent in London. A student of economics, he became a socialist, and, gifted with a powerful voice and homely eloquence, was soon one of the most effective open-air speakers in London. Equally active as a trade unionist, in 1885 he contested W. Nottingham as a social democrat. In 1886, after a riot of unemployed in London, he was tried and acquitted of inciting the mob to violence, but in 1888 he was sentenced to imprisonment for resisting the police over the right of public meeting in Trafalgar Square. In 1889 he was a leader in the London dock strike.

Burns's official career began when in 1889 he was elected to the first London County Council. Three years later he was elected Labour M.P. for Battersea, and was again returned in 1895, 1900, 1906, and 1910. He became identified politically with the Radicals, and in 1905 entered the Liberal cabinet as president of the Local Government Board. He held this post until 1914, when he was transferred to the Board of Trade. Resigning office on the outbreak of the First Great War, he retired from Parliament 1918. He died Jan. 24, 1943. His unique library of books about London was bought by Viscount Southwood and presented to the L.C.C., 1943.

BURNS: SCOTLAND'S NATIONAL POET

T. F. Henderson, LL.D., Scottish Biographer and Historian

This account of the poet's life and times may be supplemented by the articles on Scotland: Literature; Poetry; Song, etc. See also Articles on Scott; Shelley; Wordsworth, and other poets of the time

Robert Burns was born Jan. 25, 1759, being the eldest son of William Burnes, of old Kincardineshire farmer descent, and Agnes Broun, an Ayrshire farmer's daughter. William Burnes, owing to his father's Jacobitism, had to make his own way in the world, and, after various experiences as a gardener, he leased seven acres of land for a nursery garden at Alloway, Ayrshire, where he built the two-roomed clay cottage in which the poet was born.

The boy owed an excellent education to the wise solicitude of his father, who induced certain of his neighbours to join him in engaging a young teacher, William Murdoch, from Ayr, for whom they hired a room in Alloway. He continued at school for two years after the family's removal, in 1766, to the farm of Mt. Oliphant. In 1772 he attended Dalrymple parish school to improve his handwriting, and in 1773 spent a few weeks with Murdoch at Ayr to revise his English grammar and study French. He became a fairly good French scholar, but never acquired more than a smattering of Latin.

Meantime, certain selections in his school reader had thrilled his sensibilities, and the songs and weird tales of a superstitious old maid of his mother had sown in his mind "the latent seeds of Poesy." The first two books he read, *The Life of Hannibal* and the modernised version of *Blind Harry's Wallace*, roused his military ardour, and the latter poured "the Scottish prejudice into his veins" which was to find overwhelming expression in Scots wha hae.

Burns's First Song

For a time his reading was confined to the serious books of his father, but before manhood it also included much 18th century poetry, together with some plays of Shakespeare, and *The Lark*, a collection of English songs, which he was accustomed to "pore over song by song and verse by verse, carefully noting the tender and sublime from affectation and fustian." But his literary inclinations were not favoured by his circumstances. From his fourteenth year he did the work of a grown ploughman, his life then "combining," he affirmed, "the gloom of a hermit with the toil of a galley slave."

His first song, *Handsome Nell*, was written at the age of sixteen, in honour of a harvest partner;

but not until his twenty-fifth year did the exceptional potency of his genius begin to manifest itself. A partnership in 1782 with a flax-dresser at Irvine, though a business failure, widened his knowledge of mankind, and led to a "bosom friendship" with a sea-captain, Richard Brown. His father's death, Feb. 13, 1784, delivered him from certain irksome restraints. He, his brother, and two sisters, having made good their claims as creditors for several years' wages, now combined in leasing the farm of Mossgiel, near Mauchline.

Jean Armour and Mary Campbell

In Nov., 1784, he celebrated the consequences of his amour with a servant in the *Address to an Illegitimate Child* (Thou's welcome, wean), and soon the perusal of Robert Fergusson's poems gave him a new poetic stimulus. His ecclesiastical satires, *The Twa Herds*, published probably as a broadside, and *Holy Willie's Prayer*, won the applause of some influential friends, and, incited by this and by other influences, he, within six months of 1785-86, penned, in addition to the amazing *Jolly Beggars*, the bulk and best of the pieces of the *Kilmarnock* volume published on July 20, 1786. Within a month the whole 600 copies printed were sold, and kindled the enthusiasm of all Ayrshire.

This success did not, however, alter his resolution to emigrate to Jamaica, a decision due partly to lack of farming success, but mainly to his double love entanglement with Jean Armour and Mary Campbell. Discovering that Jean Armour was with child by him, he gave her a paper which, according to Scots law, made them man and wife, but, overborne by her parents, she destroyed it, and, after a short and ardent courtship of Mary Campbell, he apparently made arrangements to take her with him to Jamaica. His voyage thither, having, however, been accidentally postponed, was rendered less imperative by the death of Mary Campbell in the autumn of 1786, and was indefinitely suspended by the prospect of publishing a second edition of his poems in Edinburgh.

To secure this, Burns resolved to journey thither, and the chief Edinburgh publisher, William Creech, was induced by the earl of Glencairn to bring out the volume. As many as 3,000 copies were sold, and Burns obtained by

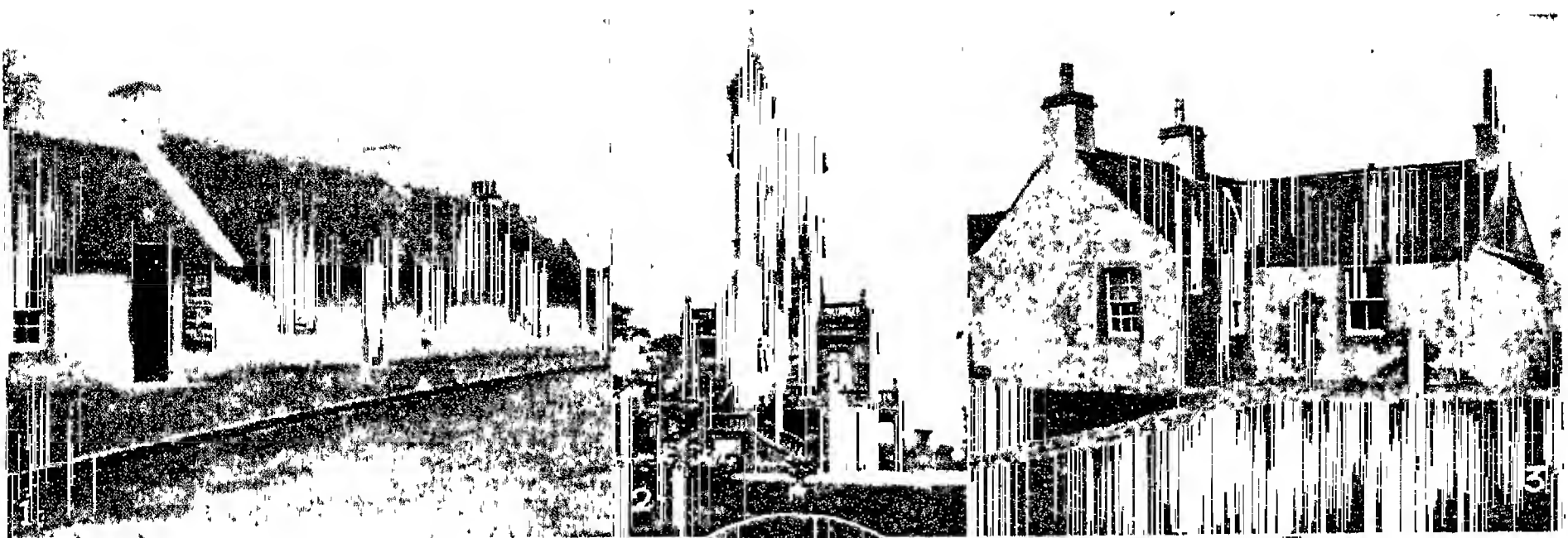
it £500. Meantime, in the learned and fashionable circles of Edinburgh, his mingled modesty and self-possession commanded a kind of wondering respect. Socially and pecuniarily successful as his Edinburgh sojourn was, it was but a passing episode, to which he afterwards referred as his "late hare-brained ramble into life."

Burns's astounding flirtation with the grass widow, Mrs. Macle hose, and other amours and incidents presaged that residence in Edinburgh would be disastrous to him, and, having renewed his relations with Jean Armour, he resolved to acknowledge her as his wife. After lending his brother and sisters £300, he settled in 1788 on the farm of Ellisland, Dumfriesshire. This was not, however, a successful venture, even when supplemented by a salary of £50 a year from an excise appointment obtained in 1789; and in the autumn of 1791 he quitted the farm for an ordinary excisemanship at Dumfries, at a salary of £70, which was raised to £90 when, in 1792, he was promoted port officer. Further promotion was prevented by the imprudent expression of his political sympathies. This injuriously affected both his spirits and habits, and he was almost hopelessly disheartened before an exposure to the weather brought on the illness which ended in his death at Dumfries, July 21, 1796.

Appreciation of his Work

From the time he settled at Ellisland, the circumstances of Burns being such as they were, it is not surprising that "the large poetic plans" which he had begun to form, and for which he began the study of the English and French dramatists, had no result. Rather the marvel is that though, apart from songs, the only pieces of outstanding importance belonging to this period are *Tam o' Shanter* and *Elegy on Captain Matthew Henderson*, his lyrical compositions were so numerous and varied and often so supremely excellent.

His non-lyrical verse was, as regards form and manner, modelled largely on that of Ramsay, Fergusson, and other poets of the Scottish revival, but it far transcends theirs in passionate force and vitality. Realistic in the best sense of that term, it was inspired by his peasant experiences and surroundings; but so fine and genuine is his poetic art that it appeals irresistibly to all classes of readers. As a song-writer, he owed not a little to old poetic predecessors, both for the fragments of verse which he utilised, and for



1. Cottage at Alloway where Burns was born. 2. Monument at Kilmarnock. 3. Ellisland Farm. 4. Mausoleum at Dumfries. 5. Portrait by Nasmyth. 6. Burns Monument, Alloway. 7. Auld Brig o' Doon, Alloway. 8. Room in the cottage where Burns was born. 9. Two brigs, Ayr. 10. Alloway kirk, scene of Tam o' Shanter. 11. Jean Armour, whom Burns married in 1786. 12. House at Dumfries where Burns died

ROBERT BURNS: SCENES MADE MEMORABLE BY THEIR ASSOCIATION WITH SCOTLAND'S NATIONAL POET

the general character of his method; but here, again, whether as amender or supplanter of old verse, or as an independent creator he was signally triumphant; and it is more especially by his songs that he has come to be regarded as the national poet of Scotland.

Bibliography. Poems, Kilmar-nock ed., 1786; 1st Edinburgh ed., 1787; 2nd Edinburgh ed., 2 vols., 1793; Works, ed. J. Currie, 8th ed., with notes by Gilbert Burns, 1820; Works, with Life, ed. Allan Cunningham, 8 vols., 1834; ed. James Hogg and W. Motherwell, 5 vols., 1838-41; Life and Works, ed. R. Chambers, 4 vols., 1851-52; library ed., 1856-57; new ed. of Chambers, rev. by W. Wallace, 4 vols., 1896; Works, ed. W. S. Douglas, 6 vols., 1877-79; Memoir, R. Heron, 1797; Lives, J. G. Lockhart, 1828; C. Carswell, 1930; F. B. Snyder, 1932; M. Lindsay, 1954; The Ranting Dog, J. Lindsey, 1938; The Wind that Shakes the Barley (novel based on Burns's youth), J. Barke, 1946; There Was a Lad, Hilton Brown, 1949; Letters, ed. J. de L. Ferguson, 1931; Bibliotheca Burnsiana, J. Mackie, 1866; Lists of Books upon his Life and Writings, J. C. Ewing, 1899; R.B., Two Addresses, Lord Rosebery, 1896.

Burnside, Ambrose Everett (1824-81). American soldier. Born at Liberty, Indiana, May 23, 1824, he graduated at West Point, but left the army after a few years' service. He joined the Federal forces at the beginning of the Civil War as a colonel of volunteers, and by Nov., 1862, had become commander of the army of the Potomac. He suffered defeat and his troops heavy loss at the battle of Fredericksburg (*q.v.*), Dec. 13. Later he was a corps commander under Grant and was censured for his want of success at Petersburg. Governor of Rhode Island, 1866-69, and a senator in 1875 and 1881, he died at Bristol, Rhode Island, Sept. 3, 1881.

Burntisland. Royal burgh of Fife, Scotland. It is on the Firth of Forth, 8 m. N. of Edinburgh, and has a rly. station. A summer resort, with golf links and open-air swimming pool, it has docks and a good harbour, shipbuilding yards, a trade in oil, and exports coal and iron and processes alumina. Ross-end Castle adjoins the harbour. The parish church, erected at the latter end of the 16th century, a peculiar structure built in the form of a square, and surmounted by a short, irregular tower, has features in common with the North Church at Amsterdam. Pop. (1951) 5,668.

Burr or **BUR**. In botany, any prickly or spiny calyx, involucre,

or fruit. The principal example is the involucre of the common burdock (*q.v.*), the name being sometimes used (as by Shakespeare) to denote the plant. The term is also used of the small fruits of the goose-grass. In Scotland it is applied to the thistle-head and to the fir-cone. In metal work, the term is employed for the rough edge or protuberance on metal caused by punching or hammering.

Burr, Aaron (1756-1836). An American politician. Born at Newark, in the British colony of New Jersey, Feb. 6, 1756, he served with distinction in the War of American Independence on the colonial side. In 1783 he began to practise as a lawyer in New York, and became one of the leaders of the opposition to the Federalists. A senator, 1791-97, in the presidential election of 1800 Burr received exactly the same number of electoral votes as Jefferson. The disputed election was thrown into the expiring house of representatives, and it was mainly owing to the influence of Alexander Hamilton, who thought Jefferson a misguided radical, but Burr a rascal, that the defeated Federalists were induced to vote for Jefferson. In 1804 Burr was defeated for the office of governor of New York, again, so he thought, through the influence of Hamilton, whom he challenged to a duel and mortally wounded.

Conceiving a scheme for conquering Texas and making it the nucleus of a new independent republic in the west, he was tried for treason but acquitted, 1807. He then found it advisable to retire to Europe, returning in 1812. The rest of his life was passed in obscurity. He died Sept. 14, 1836.

Burra or **Koorringa**. Town of South Australia. It is on Burra Creek, 101 m. by rly. N. of Adelaide. The once celebrated Burra copper mine, discovered in 1844, is exhausted.

Burra, Edward (b. 1905). English artist. Born at Kensington, March 29, 1905, he studied at Chelsea Polytechnic and the Royal College of Art, and lived at Rye. In search of subjects he visited New York, Mexico, Spain, and France. He designed scenery and costumes for the ballets *Rio Grande*, 1931, *Barabau*, 1938, *Miracle in the Gorbals*, 1944. He painted the less reputable strata of the life of cities, dwelling often on the grotesque and repulsive, with high colour and originality. A study of his work was issued by Penguin Books in 1945.

Burrard Inlet. Deep, narrow arm of the Strait of Georgia, in S.W. British Columbia. Nine m. long, it forms one of the best harbours on the Pacific coast. It abounds in fish, and game is plentiful along its shores. Vancouver stands on its S. shores.

Burrenjuck or **Burrinjuck**. Mountain of New South Wales, Australia, 40 m. N.W. of Canberra. Near it a dam impounds the waters of the Murrumbidgee. It measures 220 ft. by 784 ft., has a capacity of 33,500 million cubic ft., and a catchment area of 5,000 sq. m. This water irrigates a million acres of the Riverina district, and also serves two hydro-electric power stations.

Burriana. Coast town of Spain, in the prov. of Castellón. It is 8 m. by rly. S. of Castellón de la Planá, on the Rio Seco, one mile from its mouth in the Mediterranean. Oranges and melons are exported. Pop. 14,000.

Burrington Combe. Gorge in the Mendip Hills, Somerset, England, about 12 m. S.W. of Bristol. There are four caves in the carboniferous limestone. The story runs that Augustus Toplady, sheltering here from a storm in 1775, wrote the hymn *Rock of Ages*.

Burritt, Elihu (1811-79). American philanthropist and linguist—"the learned blacksmith." Son of a shoemaker, he was born at New Britain, Conn., Dec. 8, 1811. A blacksmith by trade, his study of the Bible inspired him with the desire of reading it in Greek, Hebrew, and other versions, and he is said to have acquired a knowledge of some 50 languages. During a visit to England in 1848 he founded the League of Universal Brotherhood and organized the first international peace congress. He was also a strong opponent of slavery. His writings include *A Walk from London to Land's End, and Back*, 1865. He died at New Britain, March 7, 1879. *Consult* Life, ed. C. Northend, 1879.

Burroughs, Edgar Rice (1875-1950). An American novelist. He was born at Chicago Sept. 1, 1875, and educated at Harvard school there and the Michigan military academy. He worked as gold-miner, storekeeper, cowboy, and policeman before having his first novel, *Tarzan of the Apes*, published in 1914. Burroughs became a prolific writer of highly imaginative novels, depicting either life on other planets or a superman living in amity with wild beasts. He estimated in 1939 that his *Tarzan*, the ape-man, had earned him

£20,000,000. He died at Tarzana, Calif., March 19, 1950. Later books included *Swords of Mars*, 1936; *The Lad and the Lion*, 1938; *Tarzan and the Forbidden City*, 1938; *Carson of Venus*, 1939; *Synthetic Men of Mars*, 1940. Many of his stories were filmed.

Burroughs, EDWARD ARTHUR (1882-1934). British divine and author. Born Oct. 1, 1882, he was educated at Harrow and Balliol College, Oxford. He was a fellow and classical lecturer of Hertford College, 1905-20. Ordained in 1908, Burroughs became chaplain to the king in 1917 and was dean of Bristol, 1922-26, being then translated to the see of Ripon. He wrote many religious works, e.g. *A Faith for the Firing Line*; *The Valley of Decision*; *The Christian Church and War*; *Toward Reunion*. He died Aug. 23, 1934.

Burroughs, JOHN (1837-1921). American author. Born April 3, 1837, at Roxbury, New York, and brought up on his father's farm, he was successively teacher, journalist, treasury clerk, and bank-examiner. In 1874 he retired to a fruit farm at Esopus, N. Y.

In addition to Walt Whitman as Poet and Person, 1867, his books, consisting chiefly of nature studies, include *Wake Robin*, 1871; *Fresh Fields*, 1884; *Signs and Seasons*, 1886; *The Summit of the Years*, 1913. He died Mar. 2, 1921.

Burrows, SIR FREDERICK JOHN (b. 1887). British administrator. He was working on the G.W.R. at the outbreak of the First Great War, when he enlisted in the Grenadier Guards. After the war he became a member of the executive committee of the N.U.R. and president 1943-44. Burrows was also a member of the national executive committee of the Labour party. In 1944 he went to Ceylon as a member of the commission on constitutional reforms under the chairmanship of Lord Soulbury. Governor of Bengal 1945-47, he became chairman of the agricultural land commission, 1948. He was knighted 1945.

Burrus, AFRANIUS (d. A.D. 63). Minister of the emperor Nero. Prefect of the praetorian guard under Claudius, on Nero's accession Burrus and Seneca, the emperor's tutor, exercised a restraining influence upon him, the effects of which unfortunately did not last. Burrus is said to have been poisoned by the orders of Nero.

Bursa (Latin, *purse*). A cavity in fibrous tissue filled with lubricating fluid. Bursae exist nor-

mally in many parts of the body frequently subjected to pressure, such as the joints and tendons. Their function is to reduce friction and assist the gliding of one structure over another. Bursae may also form abnormally in places where pressure is continually applied, as over the vertebral prominences in porters. Bursitis is a condition of inflammation of a bursa. Inflammation and enlargement of the bursa of the knee constitutes the condition known as housemaid's knee, and enlargement of the bursa over the point of the elbow is termed miner's elbow. Bursae may also become involved in patients suffering from gout or rheumatism. Bursitis may be mistaken for arthritis; an X-ray will decide.

Bursa. City of Asiatic Turkey. Capital of the vilayet of the same name, it lies at the foot of Mt. Olympus, 60 m. S. of Istanbul. Anciently known as Prousa and Brusa, the capital of Bithynia and for a while of the Turkish empire, it is beautifully situated in a fertile plain, is a flourishing commercial centre, produces wine, and exports silk, meerschaum, and fruits. Its port is Mudania, with which it is connected by rly. A ruined citadel stands on a height in the middle of the city, in which there are over 100 mosques and many tombs of sultans. The district is highly mineralised and has hot sulphur springs.

Bursa is the seat of both Greek and Armenian archbishoprics. It was besieged in 1317 by Othman and captured ten years later by Orkhan, who made it the capital of the empire. In 1833 it was taken by Ibrahim Pasha. Pop. (1950) 100,007.

The vilayet, on the Sea of Marmara, produces cereals, cotton, and tobacco, and is rich in minerals. Pop. (1950) 541,987.

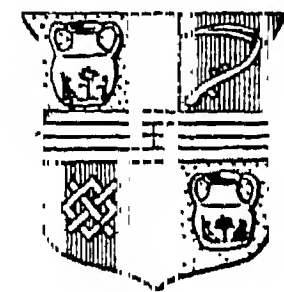
Bursar (Latin *bursa*, *purse*). Treasurer, especially of a college, school, or other institution. In Scotland the term is applied to a student who holds a bursary. In Germany a bursar (*Bursch*) is a student who resides in a *bursa*, a kind of hostel managed by a graduate.

Bursary. Scottish term for a scholarship or exhibition. Originally the bursaries at Scottish universities were very meagre, but after 1863 many were consolidated and fresh ones founded. The Carnegie Trust, 1901, provides bursaries to assist Scottish students in the payment of university class fees. In England the word is

sometimes used for a particular kind of scholarship, this being a sum of money given, usually after competitive examination, to enable a pupil to go from an elementary to a secondary school. In another sense bursary is used for the office of a bursar, i.e. a place where the financial business of a college or monastery or other foundation is carried on.

Burschenschaft (Ger. *Bursch*, student). German word for societies existing among university undergraduates. Dating from the patriotic enthusiasm of the War of Liberation, the first was formed at Jena in 1815, and three years later an association was started. Owing to disorders caused by them, they were declared illegal, but were still in evidence in the revolutionary movements that culminated in 1848. A reformed type of society, in which duelling is forbidden, also exists in the German universities. In 1902 a monument to the movement was erected at Eisenach.

Burslem. Parish of Staffordshire, England. It is 20 m. N. by W. of Stafford, with good railway and canal communications.



Burslem arms

Created a mun. bor. in 1878, Burslem was constituted a part of the co. bor. of Stoke-on-Trent in 1908, the order operating as from March 31, 1910. Known as the "mother of the Potteries," it began the manufacture of pottery in 1644, and was the birthplace of Josiah Wedgwood. The Wedgwood Institute (1865) comprises a school of art, museum, free school, and library. It is Pointed in style and is decorated with terra-cotta. On the outside there are 12 panels representing the various processes in the manufacture of earthenware. There is a statue of Wedgwood on the façade, and in the porch bas reliefs of Priestley, Flaxman, and Bentley. There is a town hall, a stately edifice, and two covered markets. Porcelain, Parian, china, and encaustic tiles are produced, and there is also a glass works. Until 1950 Burslem gave its name to a parliamentary division of Stoke-on-Trent. One of the Five Towns, it is the Bursley of the novels of Arnold Bennett (q.v.). Market days, Monday and Saturday.

Burt, SIR CYRIL LODOWIC (b. 1883). British psychologist. He was born March 3, 1883, and educated

at Christ's Hospital, Jesus College, Oxford, and Würzburg university. John Locke scholar in mental philosophy at Oxford in 1908, he was a lecturer in experimental psychology at Liverpool university 1909-13. Burt was professor of psychology at University College, London, 1931-50, and president of the British psychological society, 1942. He received a knighthood in 1946. The intelligence tests devised by him for the L.C.C. were extremely valuable. Amongst his published works are *Mental and Scholastic Tests*, 1921; *How the Mind Works*, 1933; *Factors of the Mind*, 1940.

Burt, THOMAS (1837-1922). A British politician. Born in Northumberland, Nov. 12, 1837, the son



Thomas Burt

Russell

of a miner, he started work in the coal mines at the age of ten, and worked 18 years underground. He was secretary of the Northumberland Miners' Association, 1865-1913, and Liberal and

later Labour M.P. for Morpeth, 1874-1918. He attended several International Miners' Conferences, and in 1890 was one of the British representatives at the Berlin labour conferences. He was parliamentary secretary of the Board of Trade in the Liberal ministry, 1892-95. He died April 13, 1922.

Burton. Strong, fine ale called after Burton-upon-Trent, where it was originally brewed. It contains less hops than bitter.

Burton, BARONY OF. See under Bass, M. T.

Burton, SIR FREDERICK WILLIAM (1816-1900). Irish painter. Born April 8, 1816, in co. Clare, he studied at Dublin. In 1842 he began to exhibit at the Royal Academy, London, from 1851 to 1858 he was at Munich, and from 1856 to 1870 was a member of the Royal Society of Painters in Water Colours. On his appointment as director of the National Gallery, London, 1874, he gave up painting and devoted himself to the improvement of the national collection. His painting was strongly influenced by pre-Raphaelitism. He was knighted in 1884, and died in London, March 16, 1900.

Burton, HENRY (1866-1935). South African politician. Born at Cape Town, and educated at S. Andrew's College, Grahamstown,

he became a lawyer in 1892. In 1902 he was elected to the House of Assembly of the Cape of Good Hope, of which province he became attorney-general. He entered the legislature of the Union of South Africa, and in 1912 was made minister of railways and harbours, and later minister of finance, in the S. African government. He was a member of the Imperial war cabinet when he visited London in 1918, and was at one time acting premier of S. Africa. He died Dec. 25, 1935.

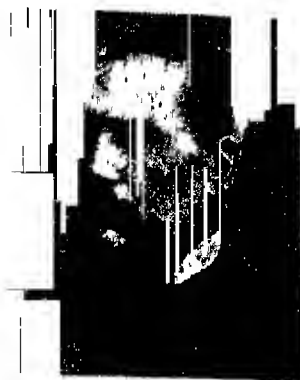
Burton, JOHN HILL (1809-81). Scottish historian. Born at Aberdeen, Aug. 22, 1809, and educated at the Marischal College, he was called to the bar, but supported himself mainly by his pen, contributing to *The Westminster Review*, *The Edinburgh Review*, and *Blackwood's Magazine*, also to *Chambers's Encyclopædia*. In 1854 he was appointed secretary to the Prison Board of Scotland, and in 1870 completed his *History of Scotland*, begun in 1853. He also wrote a *Life of Hume*, 1846. He died near Edinburgh, Aug. 10, 1881.

Burton, SIR MONTAGUE MAURICE (1885-1952). British industrialist. Born Aug. 15, 1885, he began work in a Sheffield tailor's shop where he found working conditions both inhumane and uneconomic. Starting on his own account at 19, he became eventually controller of a nation-wide chain of shops, and also a model employer. He endowed chairs of industrial relations at Cambridge, Cardiff, and Leeds, and of international relations at Oxford, Dublin, and the London School of Economics. He was knighted 1931; and died Sept. 21, 1952.

Burton, RICHARD (b. 1907). English golfer. Born at Darwen, Lanes, Oct. 11, 1907, he began his golfing career as a caddy. In 1931 he became the professional at Hooton, Cheshire, and won the Northern professional championship in 1934. Burton was a member of the British Ryder Cup team for the first time in 1935 and the winner of the open golf championship in 1939. In the Second Great War he joined the physical training staff of the R.A.F., being released in 1945. Purely self-taught, he was one of the longest and most accurate hitters in first-class golf.

Burton, SIR RICHARD FRANCIS (1821-90). British traveller and author. Born in Hertfordshire, March 19, 1821, the son of an army officer, he spent his boyhood on the Continent, and during 1840-41 he was at Trinity College,

Oxford. He entered the East Indian army as a cadet in 1842, and passed seven years in India, acquiring an intimate knowledge of Mahomedan life. During the Crimean War he was chief of staff to General Beatson at the Dardanelles. On his appointment as British consul at Fernando Po, 1861, he was struck off the Indian army. He was subsequently British consul at Santos, Brazil, 1865-69; Damascus, 1869-71; and Trieste, 1872-90. In 1861 he contracted a romantic and happy marriage with Isabel Arundell (1831-96), who accompanied him in many of his wanderings, and was his literary executor. Made a K.C.M.G. in 1885, he died at Trieste, Oct. 20, 1890, and is buried there.



Sir Richard Burton, British traveller

His exploits included a journey, disguised as an Afghan pilgrim, to Mecca and Medina in 1853, the discovery of Lake Tanganyika in 1858, a mission to Dahomé in 1864, and the exploration of the Gold Coast in 1882. He crossed and recrossed the Andes, canoed 1,500 m. down the San Francisco river in Brazil, and voyaged up the La Plata and the Amazon.

Burton's chief works include his *Pilgrimage to El Medina and Meccah*, 1855-56; a privately printed literal translation of *The Book of a Thousand Nights and a Night*, 16 vols., 1885-88; *The Book of the Sword*, 1884; translations of Camoens and Catullus, books on Goa, Sind, Utah, Brazil, Paraguay, Central Africa, Abeokuta and the Cameroons Mountains, and Syria. He also left a MS. translation from the Arabic, of the *Scented Garden*, but this was destroyed by Lady Burton in the belief that his reputation would suffer by its publication.

Consult Lives, Lady Burton, 1893; G. M. Stisted, 1896; F. Downey, 1931; H. J. Schonfield, 1936.

Burton, ROBERT (1577-1640). English author. Born at Lindley, Leicestershire, Feb. 8, 1577, he was educated at Nuneaton, Sutton Coldfield, and Brasenose College, Oxford, and elected student at Christ Church, 1599. In 1616 he was made vicar of S. Thomas's, Oxford, and in 1630 rector of Segrave, Leicestershire, both of which livings he held until his death. Most of his life was spent

in Oxford, where he died Jan. 25, 1640. He was buried in the N. aisle of Christ Church.

Burton's *The Anatomy of Melancholy*, described on the title page as by Democritus Junior, appeared first in 1621; it ran through six editions in 30 years, brought an estate to the bookseller Cripps, and was continually revised by its author. It combines originality, humour, satire, and erudition with numberless quotations from the wisdom of all the ages. Burton's satirical Latin comedy, *Philosophaster*, was acted at Christ Church, 1617.

Burton upon Trent. County borough of Staffordshire, England. It is on the river Trent and the Trent and Mersey Canal, 28 m. N.N.E. of Birmingham. It has been noted for its ale for nearly 300 years, and a number of nationally famous breweries are established here, the industry greatly benefiting from the sulphate of lime in the water of the alabaster beds of Needwood Forest. Industries ancillary to brewing include malt roasting and the manufacture of brewing equipment, cattle food, and malt extract. Burton also has foundries, boiler making shops, and enamel works; near by are collieries, sand and gravel quarries, and fire-clay workings. There are slight remains of an 11th-century abbey. Burton gives its name to a co. constituency. Market days, Thurs. and Sat. Pop. (1951) 49,167.

In Nov., 1944, 3,000 tons of explosives in an R.A.F. underground dump at Fauld, near Burton, blew up, causing wide devastation with 68 deaths, the greatest recorded explosion in the U.K. An official report, published 1947, threw no light on the cause.

Buru. One of the Molucca Islands, Indonesia. Buru lies between Celebes and Ceram. Mountainous and well wooded and watered, it produces cajuput oil, and sago. Area about 3,400 sq. m.

Burujird. Town of Persia, in the Luristan area, formerly the capital of Luristan. It stands at a height of 5,315 ft. and is 70 m. by road S.S.E. of Hamadan. A trading centre, it makes rugs and textiles and has metal works.

Burullus OR BURLUS, LAKE. Lagoon in the Nile delta, E. of Rosetta, Egypt. It is c. 35 m. long by 3-10 m. broad. Fish are plentiful, and its low-lying shores produce fine melons.

Burutu. Port of Nigeria, West Africa. It is on an island 15 m. up the estuary of the r. Forcados where it was established by the Royal Niger co. in the late 19th century. Though access is difficult because of sand-bars, ocean-going vessels anchor in the river opposite Burutu which exports oil palm products.

Burwash. A village of Sussex, England. It is 3½ m. W. of Robertsbridge and near the river Rother. Here is Batemans, a 17th-century ironmaster's house, long the home of Kipling and acquired by the National Trust in 1940.

Bury. Town and county borough of Lancashire, England. It stands on an elevated site between the Irwell and the Roche, 9 m. N. of Manchester. From the Middle Ages it had an important woollen industry, but cotton manufacture began to supersede woollen in the early 18th century. There are calico-printing, dyeing, paper-making, iron and steel, and machinery works, and coal and stone are worked in the vicinity.



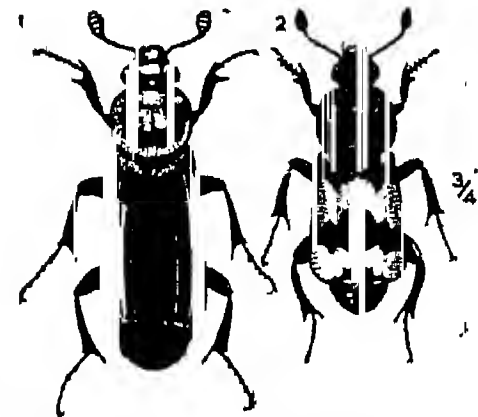
Bury arms

Notable buildings and institutions include the new town hall, opened 1954 by Queen Elizabeth II; the ancient parish church of S. Mary, rebuilt 1876; Kay's grammar school, founded 1726; and the technical college. The art gallery, museum, and public library, opened in 1901, contains the Wrigley collection of paintings, engravings, and statuary. Sir Robert Peel, to whose memory there is a bronze statue, was born near by, and John Kay, inventor of the flying shuttle, was a native. Bury became a parl. bor. in 1832, mun. bor. in 1876, co. bor. in 1888 (extended 1911). With Radcliffe and Tottington it forms a bor. constituency called Bury and Radcliffe. Market days Wed., Fri., Sat. Pop. (1951) 58,838.

Bury, JOHN BAGNALL (1861-1927). British historian. Born at Clogher, Tyrone, Oct. 16, 1861, he was educated at Trinity College, Dublin. In 1893 he became professor of modern history in Dublin University, in 1902 the regius pro-

fessor in the same subject at Cambridge: in his inaugural address he caused controversy by saying "history is a science, no less and no more." His edition of Gibbon, 7 vols., 1896-1900, superseded all others. His own writings included a *History of Greece*, 1900; and a *History of Freedom of Thought*, 1913. He died in Rome, June 1, 1927. *Pron.* bewry.

Burying Beetle. Beetle of the family Silphidae, especially the genus *Necrophorus*. The adults,



Burying beetles. 1. *Necrophorus humator*; 2. *Necrophorus mortuorum*

which are often red and black, feed on carrion, and by burrowing under any small dead animal speedily bury it. The eggs are then laid near the carcass, which serves as food for the larvae.

Bury St. Edmunds. Borough, cathedral and market town of Suffolk, England, capital of West Suffolk. It is on the Lark, 26 m. N.W. of Ipswich. The centre of an agricultural area, it makes farm implements and clothing, processes sugar beet, and has a brewery. Originally Beodricsworth, it was renamed in honour of S. Edmund, king of East Anglia, whose body was brought here for burial after his martyrdom by the Danes in 870. The Benedictine abbey later founded in his honour became one of the richest and most famous in the county. Here the barons, led by Stephen Langton, assembled in 1214 to proclaim their opposition to King John. Except for the Norman tower and the abbey gate only ruins remain. A boat's Bridge across the river Lark is late 13th century.



Bury St. Edmunds arms

The parish church of S. James, a Perpendicular structure restored in the 19th century under the direction of Sir Gilbert Scott, became the cathedral when the see

of St. Edmundsbury and Ipswich was created in 1914. S. Mary's, the only other ancient church, contains the tomb of Mary Tudor, daughter of Henry VII, 3rd wife of Louis XII of France. Moyses Hall, used as a museum, is a fine specimen of a late 12th-century house, traditionally believed to be Jewish, though there is no evidence of this. The grammar school was founded by Edward VI.

Two members were returned to parliament during 1608-1885, one down to 1918. Bury St. Edmunds gives its name to a co. constituency. Market days, Wed. and Sat. Pop. (1951) 20,056.

Bus (abbr. of *omnibus*, Lat., for all). Public passenger vehicle licensed to ply over a regular route and to pick up and set down passengers at recognized stopping places. The first bus service was established in 1662, when Blaise Pascal (*q.v.*) was granted a patent by Louis XIV authorising him to run public coaches in Paris. Pascal's vehicles seated six passengers, and each coach had a specified route, making a flat charge of five sous per passenger. The service proved a great success until Pascal's death in 1664, when the patent lapsed. No further effort to operate bus services was made until 1828, when a Parisian

banker named Lafitte commissioned George Shillibeer, an English coach-builder settled in Paris, to build two vehicles of large passenger-carrying capacity. Shillibeer's bus was drawn by three horses harnessed abreast and carried 14 persons in three compartments at different fares.

At the beginning of the 19th century business men used stage coaches to reach London from suburbs. Shortly after introducing his buses to Paris, Shillibeer came to London, and on July 4, 1839, commenced a bus service from the Yorkshire Stingo at Paddington to the Bank of England. The vehicles were drawn by three horses but were much larger than the Paris buses, seating 22 passengers inside and all in one class. The fare was 1s. for the journey from Paddington to the Bank, and the speed of the vehicles was 6 m.p.h. The buses were elaborately upholstered and well lit by large windows at the sides and front. Within a year Shillibeer had a score of buses serving some six different routes.

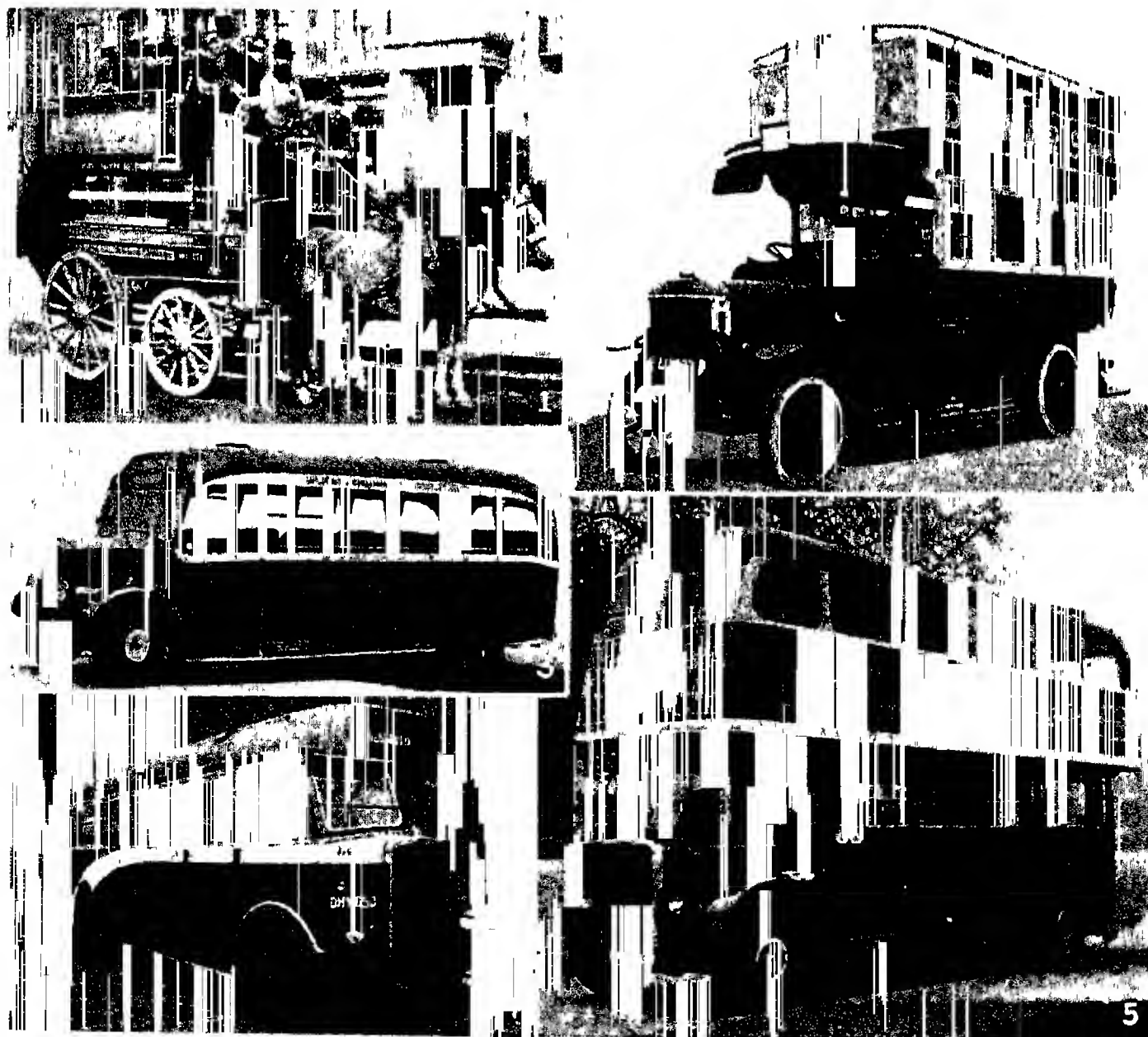
In 1849, smaller and more convenient buses were introduced, drawn by two horses and seating 12 inside passengers and two outside beside the driver. Shortly afterwards a bus was put on the

streets providing accommodation for eight outside passengers on a narrow seat, called the knife-board, which ran lengthwise along the centre of the roof and upon which the passengers sat back to back. The roof was reached by a narrow ladder from the conductor's step. In 1857 Miller of Hammersmith made considerable improvements in the bus: the conductor's narrow step was converted into a covered platform, and the step ladder to the outside seats was replaced by a winding stairway; and the seats outside were rearranged to face forward. In 1855 the London General Omnibus Company was formed through an amalgamation of the Royal Blue, Atlas, Wellington, Favourite, and Royal Oak lines.

The first mechanically propelled bus was introduced in London in 1897, when a Radcliffe-Ward electrical vehicle was put on the road between Charing Cross and Victoria. Two years later a petrol bus was plying for hire in the West End. In 1902 a Thornycroft steam-bus was put into service between Hammersmith and Oxford Circus by the Road Car Company. Motor traction encouraged a large number of new firms to establish bus services, but in 1908 most of them were absorbed by the London General Omnibus Company.

In 1910 the L.G.O.C. adopted as its standard motor-bus the B type A.E.C. vehicle; a double-decker powered by a 30 h.p. engine and seating 34.

After the First Great War a number of owner-driven, or "pirate," buses were put on the streets of the metropolis, but the majority of them were eventually absorbed by the L.G.O.C. In 1919 the K type of bus was put into service; this had a four-square body and transverse seats inside and out. It carried 46 passengers and the driver sat alongside the engine instead of behind it. The S type, seating 54 passengers, followed in 1920. In 1923 the NS type went into service, seating 52 passengers; this had a very low centre of gravity, permitting the covering in of the upper deck in 1925. Two years later the first six-wheeled bus was put into service and had accommodation for 68 passengers. Within the next few years further improvements were



Bus. 1. London horse-bus, "knifeboard" type, 1891. 2. London General Omnibus Co's "B"-type motor-bus, 1910. 3. 20-seater for country service, Aldershot, 1945. 4. Single-decker Bristol bus, 1945. 5. London Transport bus, 1945. Photos, 1, 2, and 5, London Transport; 3, Aldershot and District Traction Co., Ltd.; 4, Bristol Tramway and Carriage Co.

introduced: buses were equipped with pneumatic tires and the seats on upper and lower decks were sprung and upholstered. In 1933, the L.G.O.C., then the largest bus operating concern in the world, with over 5,000 vehicles in service, was incorporated into the London Passenger Transport Board.

Nowadays there are few cities or towns of any size throughout the world which do not have bus services. The motor bus has revolutionised social life, and the development of the country bus has brought the amenities of towns within the reach of inhabitants of the most remote villages and hamlets. As an auxiliary to the railways in country districts, the bus makes direct connexion with the stations in rural areas, and provides alternative travel facilities in the event of mishap or breakdown on the railway. The bus also provides cheap and quick transport in districts where it would be uneconomic to maintain a railway.

As a compromise between the road mobility of the motor bus and the static power source of the tram (*q.v.*), the trolley-bus (*q.v.*) was introduced early in the 20th century, but did not reach any large-scale development until 1930. See Motor Coach.

Busaco. Hamlet of Portugal, 20 m. N.N.E. of Coimbra. The secularised Carmelite monastery, founded in 1268, is now a hotel; the convent domain is a state botanical garden, with fine specimen trees.

The battle of Busaco was fought between the British and the Portuguese on one side and the French on the other, Sept. 27, 1810. With augmented forces the French, under Masséna, were invading Portugal, and Wellington was falling back before them down the valley of the Mondego. On a strong position on the Serra de Busaco, the latter decided to bar the way. The battle consisted simply of direct frontal assaults on the British lines. These were beaten off with heavy loss, and the engagement, although important, was quickly over. The French employed about 50,000 troops and lost about 5,000; the allies had somewhat fewer, but lost only 1,300. The next day, however, Masséna circumvented his foes. See Peninsular War.

Bus-bars OR OMNIBUS-BARS. In electricity, conductors which collect in one or a number of common circuits the current generated by the various dynamos

in a central station for distribution to the feeders of the supply mains. The term is also applied to the terminations of the main conductors on a distribution board from which the subsidiary circuits branch off. Switches or fuses, or both, are generally interposed at the junctions. Bus-bars are usually of copper strip, but rods or cables of the metal are sometimes used for central station purposes.

In power stations where current of high tension is generated the bus-bars of opposite polarity are isolated from one another, and are installed in separate buildings.

Busby. Head-dress of hussars, horse artillery, artillery bandsmen and certain rifle corps of the British army. The term is often wrongly applied to bear-skin caps, and to the Highlander's feather bonnet. The busby was worn by officers of the Royal Engineers until as late as 1876.

Busch. Name of a family of German musicians. Fritz (1890-1951), born March 13, 1890, at Siegen, Westphalia, entered Cologne conservatoire in 1905, and in 1909 was appointed conductor of the state theatre at Riga. He served during the war of 1914-18, afterwards becoming director of music at Stuttgart national theatre, then at Dresden. In 1933 he left Germany for Copenhagen, and in 1940 went to Argentina. He conducted at the first Glyndebourne opera season in 1934, and again in 1950 and 1951. He died in London Sept. 15, 1951. He published a volume of memoirs in 1946.

His brother Adolf Georg Wilhelm (1891-1952), also born at Siegen, Aug. 8, 1891, entered Cologne conservatoire in 1902, where he studied the violin under Fritz Steinbach. He gave his first concert at three; at 21 he became leader of the Vienna Concertverein orchestra, and in 1919 founded the Busch string quartet, in which his younger brother Hermann was cellist. He moved to

Basel in 1927, acquiring Swiss nationality in 1935. In 1931 and 1935 he toured the U.S.A., where he later made his home. A notable player of Bach, whose solo sonatas he edited, he wrote symphonies; violin, piano, and clarinet concertos; songs and sonatas, including one for piano and violin. He died at Guildford, Vermont. U.S.A., June 9, 1952

Busch, JULIUS HERMANN MORITZ (1821-99). German author. Born at Dresden, Feb. 13, 1821, and educated at the university of Leipzig, his first writings were translations of Dickens and Thackeray. In 1851 he visited the U.S.A. He travelled in the East, wrote for the press, and in 1870 was given a post in the German foreign office, where he acted as press agent to Bismarck, whose private secretary and confidant he became, and whom he accompanied through the Franco-Prussian war. Busch kept a daily record of the chancellor's sayings and doings, and as Bismarck's Boswell published the first part of his diary in 1878. He died at Leipzig, Nov. 16, 1899.

Bush. In engineering, a tubular bearing for a shaft, or a detachable liner or cylindrical piece fitted into a bearing.

Bush (late Lat. *boscus*, a wood). Term used to denote either a single many-branched shrub of close growth, or a place overgrown with trees or shrubs, a thicket or wood.

Now chiefly used in the former sense, it was employed in the larger sense by Chaucer, and is still so used in Australia and Africa, where the word denotes wild country.

Bush Antelope OR BUSH BUCK (*Tragelaphus sylvaticus*). One of the smaller African antelopes. Found from Abyssinia to the Cape, it is about the size of a goat, and the almost straight horns of the male are about 12 ins. long. The female is hornless. In colour it is reddish brown.

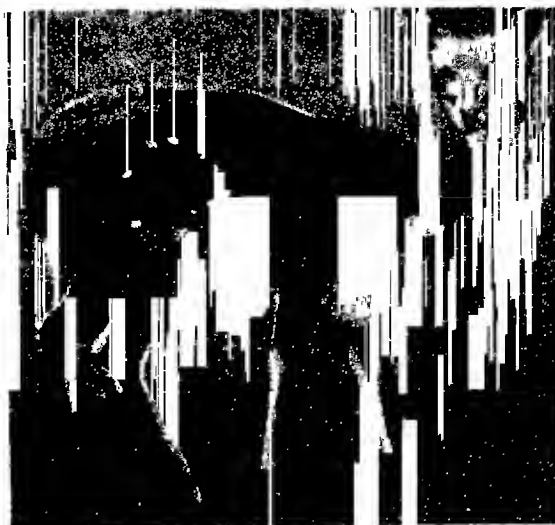
Bush Baby. See Galago.

Bushel. British dry measure of

capacity, used for grain, potatoes, fruit, etc., containing four pecks or eight gallons. The imperial bushel, established in 1826, contains 2,218.191 cu. ins. or 80 lb. avdp. of distilled water. The smaller bushel of Canada and the



Busby of the 8th Hussars



Bush Antelope or bush buck, a small African antelope
W. F. Berridge, F.Z.S.

U.S.A. is derived from the old Winchester bushel which contained 2,150.41 cu. ins.

Bushey. Urban district of Hertfordshire, England, adjoining Watford. It is a residential area, 13 m. N.W. of London, and includes Bushey Heath, close to Stanmore, Middlesex. Here are the Royal Masonic boys' schools, and the Royal Caledonian and other schools. There are golf courses at Hartsbourne Manor and Bushey Hall. Pop. (1951) 14,833.

Bush House. Office building in Aldwych, London. Originated by a U.S. businessman, Irving T. Bush (1869-1948), and designed by a U.S. architect, Harvey W. Corbett (1873-1954), it consists of a central building flanked by four wings. It was built 1920-32 at a cost of £1,500,000. The main elevation, which faces the length of Kingsway, is 100 ft. high and 80 ft. wide. A group of statuary over the portico is dedicated to the friendship of the English-speaking peoples. The leasehold of Bush House, which is the headquarters of various international business concerns, was bought in 1955 by the Church in Wales.

Bushido (Jap., the way of a soldier). A Chinese code of conduct (*wu shih tao*, the way of the warrior knight) raised into a cult by the warrior class of Japan. Bushido, originally a Japanese counterpart of medieval European chivalry, consisted of a vast body of unwritten rules and points of etiquette which from the 12th century governed every phase of life of the Samurai or military caste of Japan. In 1882 an imperial rescript gave Bushido a written code, and from that date a copy formed part of every Japanese soldier's kit. Following the Japanese defeat in 1945, the teaching of Bushido was suppressed by the occupying powers.

Bushire, BUSHEHR, BENDER SHEHR, OR BANDER BUSHAR. Seaport of Persia. Situated on a sandy peninsula on the N.E. shore of the Persian Gulf, it has a large trade, especially with India. Its harbour is shallow, but a deep-water harbour has been developed at nearby Rishahr. It has an airfield and a government radio station. It exports carpets, tobacco, opium, wool, nuts, and gums. Bushire was founded by Nadir Shah in 1736 and superseded Bandar Abbas as the chief Persian Gulf port, but was itself superseded by Abadan. Following disturbances in 1915, it was occupied by British troops Aug.-Oct. Pop. (est. 1955) 30,500.

Bushmen. Primitive aboriginal people in S. Africa. Driven by European and Bantu encroachments into the



Bushman. Typical man of this people

barren districts extending from Great Bushman Land (lower Orange river) across the Kalahari desert to the N. of Damara-land, they formerly occupied a more extensive area. As far north as Abyssinia their traces, for example their paintings, have been found. The physical characters of the Bushmen, while resembling those of true Negroes in the long head and bulging forehead, differ in their yellowish skin, straight face, shorter stature (5 ft.), and more spiralled ("peppercorn") hair form. They have been reduced to a few thousand.

Essentially hunters, they use small bows and detachable arrows, usually poisoned; the women use the digging-sticks (*kibi*) for ants' eggs ("Bushman rice") and roots. Ostrich egg-shells take the place of pottery. Dwelling in caves or in rough dome-shaped shelters made of twigs and grasses, they wear a short apron and a skin mantle (*kaross*) which serves as a sleeping-blanket and hold-all; some groups also wear skin or bast sandals. For ceremonials they use paint and primitive musical instruments.

Their skilful rock-engravings and cave-paintings resemble those of Palaeolithic Europe. In some tribes art took the form of stone sculpture. The belief in an after life is attested by their burial customs, which include the deposition of grave-goods and the gradual erection of a cairn by the passer-by. They have an extensive mythology and oral folk lore.

The Hottentots are thought to be closely related to Bushmen.

Bushnell, HORACE (1802-76). American theologian. Born at Litchfield, Connecticut, April 14,



Horace Bushnell, American theologian

1802, and educated at Yale, he was a Congregational minister at Hartford, 1833-59. Famed as a preacher he provoked lively opposition by his anti-Calvinistic writings, e.g. *Christian Nurture*; he believed that mysticism, free will, and a

Christian upbringing, not election, provide the way to salvation, and had great influence in modifying and broadening the Protestant theology of his time. He died Feb. 17, 1876.

Bussa. Town of Nigeria, West Africa, in Ilorin province. It stands on the Niger, at the head of navigation, 30 m. N.N.W. of the confluence of that river with the Kontagora. A straggling town, it is encompassed by a wall. Here Mungo Park was drowned in the rapids in 1805 or 1806.

Bushranger. Australian term, originally meaning a man who ranged the wilderness, which came to be applied to escaped convicts, or to those who subsisted in the bush by robbery under arms. The first recorded bushranger was "Black Caesar," shot in 1796.

Bushranging activity fell into two periods, with the discovery of gold in 1851 as the dividing line: during 1794-1851 it was followed by convicts or ex-convicts; 1851-80 was the golden age of the "wild colonial boys"—some of whom carried their activities to the Californian goldfields. Throughout, the worst bushrangers were in Tasmania, which was the gaol of the worst offenders among the convicts, and many of these "Van Demonians," as they were called, were also active on the Australian mainland.

Among notorious bushrangers were Lemon and Brown, operating in Tasmania, about 1812; Black Michael Howe (the king of the rangers) shot in 1818; William John Westwood (Jacky Jacky), executed in 1846; Ben Hall, regarded as the most amiable, active 1862-65; Frederick Ward (Captain Thunderbolt), originally a lay preacher at Bacchus Marsh, shot in 1870; Martin Cash, who died in respectable retirement in Norfolk I., 1877; and Gentleman Matthew Brady, operating 1884-86.

The youthful Kelly Gang (*see* Kelly, E.), consisting of Ned Kelly as leader, his brother Dan, Joe Byrne, and Steve Hart, were the last of the bushrangers, and certainly the most famous. During their brief career, they killed three mounted policemen, "rustled" sheep and cattle, and staged several hold-ups including two brilliantly planned and executed bank robberies, at Euroa (Victoria) and Jerilderie (N.S.W.) This gang has passed into legend in Australia. *Consult* *Robbery Under Arms*, Rolf Boldrewood, 1888; *History of the Australian Bushrangers*, G. E. Boxall, 1899;

Thunderbolt, A. Rixon, 1945; Australian Son: the story of Ned Kelly, M. Brown, 1948; Wild Colonial Boys, F. Clune, 1948; Gunman Gardiner, F. Clune, 1951.

Bush Shrike OR ANT SHRIKE (*Thamnophilus*). Bird of S. America. There are several species, all found in the forests of Brazil. They are about 5½ inches long and feed upon ants and other insects.

Bushy Park. Royal park in Middlesex, England. It lies beside the Thames, in Teddington parish, 14 m. W. of London. Together with the adjoining home park it comprised the park attached by Wolsey to Hampton Court Palace grounds. It is 1,110 acres in area and contains the King's Canadian School for children and the national physical laboratory, the director of which lives in the mansion called Bushy House, originally Upton Lodge, which was the home of William, duke of Clarence, before he became King William IV. The so-called Diana fountain (the statue may represent Venus or Arethusa) dates from 1699. The famous triple avenue of horsechestnuts and limes, over one mile long, was planted by William III. In 1944 Gen. Dwight D. Eisenhower, supreme commander of the Allied Expeditionary Force, had his h.q. here for a short time.

Business. In English law, anything which is an occupation as distinguished from a pleasure. There need be no intention to make profits. Every trade is a business; but a business is not a trade unless it involves buying and selling.

Business Names. Every person or firm carrying on business under a name which does not consist of the true surname of the person or surnames of all partners who are individuals and the corporate names of all partners who are corporations, without any addition other than the true first names or initials of such first names, must, with certain exceptions, register with the registrar of business names the name, the general nature, and the principal place of business, the present (and any former) first name and surname, nationality, and usual residence of the person and of each partner. The real name and the nationality if not British must appear on all catalogues, circulars, and business letters. A company carrying on business under a name which is not simply its corporate name must also register.

Busiris. In Greek mythology, the Egyptian king who founded

Thebes. According to the story in Apollodorus, during a famine Busiris was visited by a Greek soothsayer, who told him that the yearly sacrifice of a foreigner to Zeus would end it. Busiris promptly slew the soothsayer and followed his advice until he was himself killed by Hercules.

Buskerud. Southern co. of Norway, lying to the N.W. of Oslo. Watered by the Lågen and Holingdal, it is mountainous and for the most part barren. Drammen is the capital. Area 5,738 sq. m. Pop. (1950) 156,200.

Busoni, FERRUCCIO BENVENUTO (1866-1924). Composer and world-famous pianist, of Italian-German extraction. He was born at Empoli, near Florence, April 1, 1866. His father was a clarinettist; from his mother, a pianist, he received his only pianoforte lessons. He first appeared in public in Vienna at the age of 9; at 15 he toured Italy, where he was acclaimed. He had meanwhile studied composition at Graz, and at Leipzig he was in 1866 a fellow-student of Delius.

During 1889-91, Busoni held teaching posts at Helsingfors and Moscow; during 1891-94, he taught and toured in America; during 1894-1914 and from 1920 until his death, July 27, 1924, he lived in Berlin. His many tours, which often brought him to England, established his fame as a virtuoso of monumental style.

His compositions, for the most part derivative, included operas, orchestral and chamber works, and pieces for the pianoforte—among these many arrangements of great orchestral works.

Buss, FRANCES MARY (1827-94). British pioneer in the education of girls.



Frances Mary Buss, British educationist

The daughter of the Robert William Buss who designed a few unsuccessful engravings for the original edition of *Pickwick Papers*, she joined her mother in establishing in 1850 a school in Kentish Town which, on its removal to Camden Street, was named the North London Collegiate School for Ladies. This pioneer institution for the higher education of girls was later moved to Canons, Edgware. It and the Camden School in Kentish Town, both endowed with funds provided by two of the

City Companies, are styled Frances Mary Buss schools. Their founder died in London, Dec. 24, 1894. Consult North London Collegiate School, 1850-1950, 1950.

Busselton OR VASSE. Port of Western Australia, on Géographe Bay, 150 m. by rly. S. of Perth. It is the centre of karri and jarrah timber export, in an area engaged also in dairying and fishing, and is a popular holiday resort. It was named after Grace Bussell who, in 1876, together with her father's stockman, Sam Isaacs, rescued the crew and passengers of a foundered ship, the *Georgette*. Both rode back and forth into a raging sea dragging the shipwrecked people to safety clinging to their horses' stirrups.

Bussora. See Basra.

Bustamante, SIR WILLIAM ALEXANDER (b. 1884). British West Indian politician. Of mixed blood, he was born near Kingston, Jamaica, the son of a local planter, his original name being Clarke. After working on a farm he went to Cuba and then to the U.S.A., where he took the



Sir William Bustamante

name of Bustamante. He returned to Jamaica in 1934, and set up a successful money-lending business. He entered political life in 1938, his fiery oratory and understanding of the psychology of the coloured workers securing him a commanding position in the Labour movement. Early in the Second Great War he was interned under the defence regulations, but was released in 1942. In the election of 1944, Bustamante's Jamaica Labour party defeated the People's National party, and Bustamante became minister of communications and head of the government. The general election of 1949 confirmed his party in power, which it retained until the election of Jan., 1955. In June, 1955, Bustamante was knighted.

Bustard (old Fr. *bistarde*; Lat. *avis*, bird; *tarda*, slow). Group of large, stoutly built birds, of which there are nearly forty species, all found in the Eastern hemisphere. The common bustard (*Otis tarda*) occurs throughout central and southern Europe, and ranges across Asia to Japan. Formerly common in Great Britain, it is now only occasionally found in the

S. counties. It has disappeared from Scotland and seems never to have lived in Ireland. Standing over 3 ft. in height, it is handsomely mottled with grey, brown, and black. It lives mainly on corn and young shoots, but will

also devour frogs and other small animals. The nest is merely a hollow in the ground. In winter bustards associate in large flocks, but it is usual for them to separate in the breeding season.

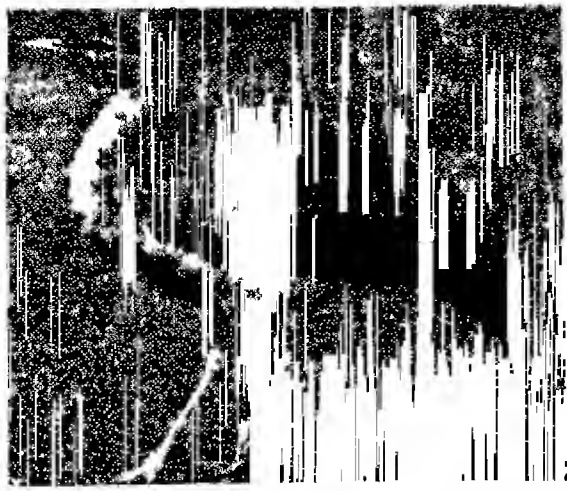
Busto Arsizio. Town of Italy, in the prov. of Varese. It is 21 m. by rly. N.W. of Milan, and is a junction for Novara and Seregno. The church of S. Maria in Piazza has a beautiful dome, and was built in 1515-23 by Lonati. It has a fine altar-piece by Ferrari and frescoes by Luini. Calico and cotton weaving are important. Pop. (1951) 52,943.

Butadiene. Hydrocarbon with the composition C_4H_6 . It is a colourless gas. Butadiene may be prepared from calcium carbide, petroleum, and alcohol, and is used in artificial rubber. See Buna; Rubber, Artificial.

Butane. Hydrocarbon compound belonging to the butyl group, each member of which has four carbon atoms in the molecule. The chemical formula is C_4H_{10} . It is also known as tetrane, diethyl, methyl-propane, and butyl-hydride. It occurs in American petroleum and is made by heating butyric and succinic acids with a large excess of hydriodic acid for some hours. Frankland, who first made it in 1849, used ethyl iodide and zinc. Butane is a gas.

Butcher (old Fr. *bouchier*, goat-killer). One who kills animals, such as sheep and oxen, for sale as human food. After slaughtering became specialised, the term denoted all taking part, either as masters or salesmen, in the trade of butchering. It is commonly applied to retail dealers in meat. The old word for a butcher was fletcher or fletcher. See Abattoir.

Butcher, SAMUEL HENRY (1850-1910). British scholar. Born in Dublin, April 16, 1850, son of Rev. Samuel Butcher, afterwards bishop of Meath, he was educated at Marlborough and Trinity College, Cambridge, of which he was elected a fellow in 1874. In 1873 he became a master at Eton;



Bustard. The largest land bird in Europe and once common in Britain

was elected M.P. for Cambridge University in 1906. In 1909 he was chosen president of the British Academy. He died in London Jan. 29, 1910. Butcher's scholarship is chiefly displayed in the prose translation, made with Andrew Lang, of the *Odyssey*, 1879; in his critical essay, 1881, on Demosthenes, whose speeches he edited, 1903 and 1907; and Aristotle's *Theory of Poetry and Fine Art* (including a translation of the *Poetics*), 1895.

Butcher's younger brother, John George (1853-1935), had also a distinguished career at Cambridge and was very successful at the chancery bar. He was Unionist M.P. for York 1892-1906 and again from 1910. In 1918 he was made a baronet. Created Baron Danesfort in 1924, he died June 30, 1935, leaving no heir.

Butcher Bird. Popular name for various species of shrike (*Lanius*), a bird found in most parts of the world except S. America. The name is derived from the bird's habit of impaling the insects it collects for food on thorns near its nest.

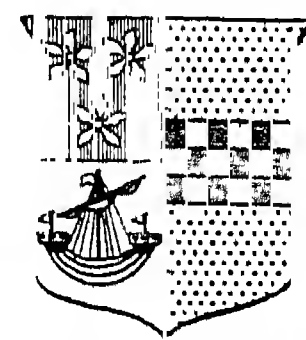
Butcher's Broom (*Ruscus aculeatus*). Evergreen shrub of the family Liliaceae, native of Europe, N. Africa, and W. Asia. Its leaves are reduced to minute scales and their functions are taken over by flat oval twigs with a sharp point, known as cladodes. These are green and leathery, and from near their centre the sexpartite greenish flowers are produced. The plants—which spring from an underground, stout, fleshy rootstock—attain a height of about 2 ft., and are either male or female; the latter bear in autumn bright scarlet berries about the size of a small cherry. The plant was formerly used for cleaning butchers' blocks, and is still employed by cigar-makers as the most effective water-sprinkler for moistening tobacco leaves.

Butchers' Company. London city livery company. Mentioned in 1180, it was incorporated in

during 1875-82 he was a lecturer at University College, Oxford. In 1882 he became professor of Greek at Edinburgh and was regarded as one of the finest Greek scholars of his day. He retired in 1903. A strong Unionist in politics, he

1605. An early hall, in Butcher Hall Lane, later King Edward Street, Newgate Street, E.C., was burnt in 1666 and its successor met a similar fate in 1829. The hall at 87-88, Bartholomew Close, was opened Sept. 7, 1885, and was damaged by a German flying bomb, July 31, 1944.

Bute. Second in size and most important of the islands comprising the co. of Buteshire, Scotland.



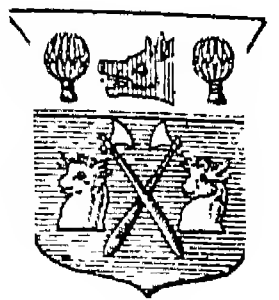
Bute. Arms of the island

Separated from the mainland of Argyllshire by the Kyles of Bute, a narrow strait, it is 16 m. long, has a mean breadth of $3\frac{1}{2}$ m., and an area of 47 sq. m. It has a rugged coast,

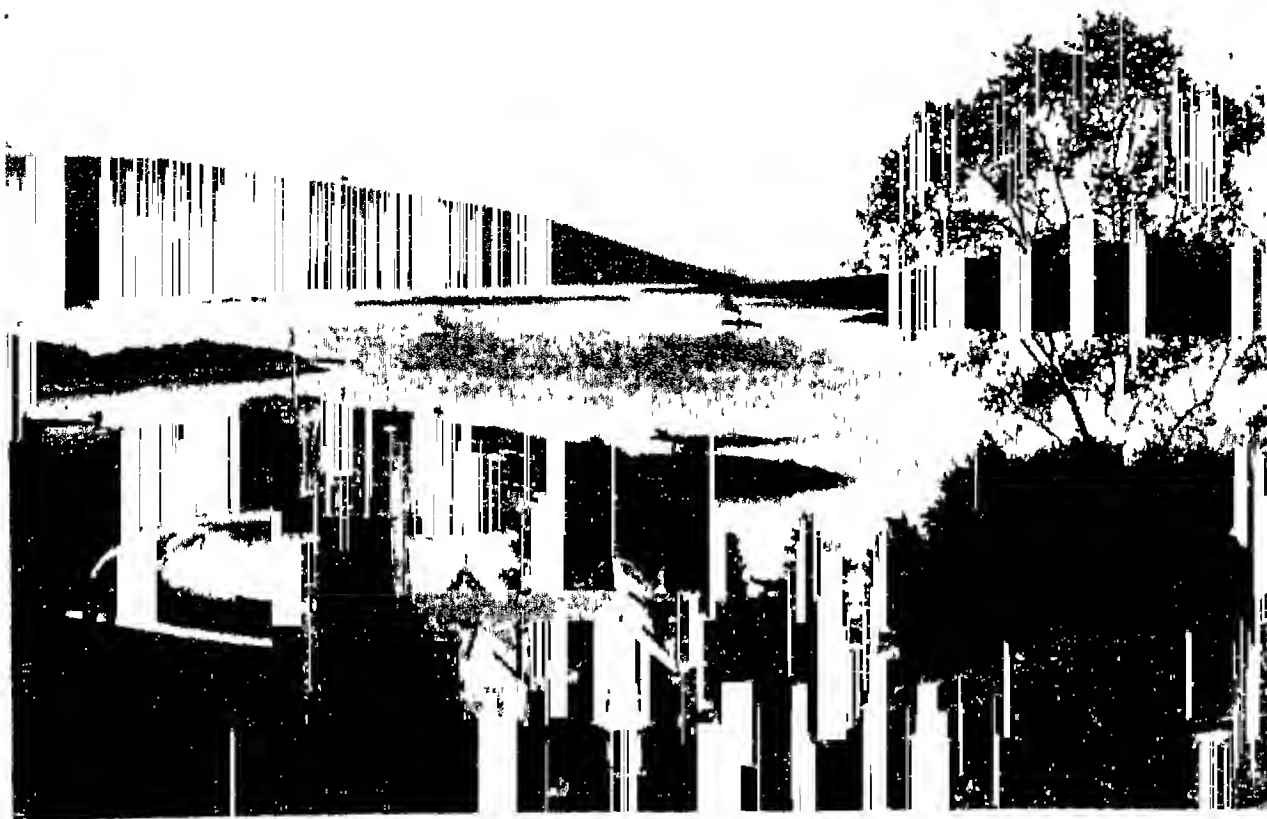
which is indented by the bays of Rothesay, Kames, Ettrick, Scalpsie, St. Ninians, and Kilchattan, several inland lochs—Ascog, Fad, and Quien—and fertile, well cultivated soil. The highest point is Windy Hill (911 ft.). Off the W. coast is the island of Inchmarnock, while off the S.E. coast lie Great and Little Cumbrac islands. Buttock Point is in the extreme N., while Garroch Head is at the S.

The climate of the island is moist, but mild, and attracts invalids. The scenery is charming, and delightful views can be obtained from any point of vantage. The climatic conditions being so favourable, flowers can be grown here which will not flourish anywhere else in Great Britain. Ripe strawberries and roses are often to be obtained in December. Rothesay, the chief town, is a favourite holiday centre for Glaswegians; other small towns are Kilchattan Bay and Port Bannatyne. Red sandstone, grey granite, clay, and slate abound; and fishing provides occupation for many. Mount Stuart, $4\frac{1}{2}$ m. S.E. of Rothesay, is the seat of the marquess of Bute. Pop. (1951) 12,547.

The castles of Rothesay, Kilmorie, and Kames are interesting features of Bute I. Among many antiquities are the stone circles at St. Colmac and Kingarth, the vitrified fort at Dungoil, and ruins of castles and ecclesiastical edifices. When the Scots came over from Ireland, they established their first settlement on Bute.



Butchers' Company arms



Bute. The Kyles of Bute, looking south-east towards Rothesay
Valentine

Bute, MARQUESS AND EARL OF. Scottish titles held by the family of Crichton-Stuart. In 1703 Sir James Stuart was made earl of Bute, in the Scottish peerage, and his grandson, the 3rd earl, was George III's prime minister, 1762-63. John, the 4th earl, was made a marquess of the U.K., 1796, and from him descended John, 6th marquess (b. 1933, succeeded 1956). John Patrick Crichton-Stuart, the 3rd marquess (1847-1900), was a scholar, archaeologist, and student of Scottish history. Mount Stuart near Rothesay is the chief residence of the family. The large Bute estate in Cardiff was sold in 1938 for £4,500,000. The Bute docks, Cardiff, became the property of the G.W.R. in 1921. The marquess's eldest son is known as earl of Dumfries.

Bute, JOHN STUART, 3RD EARL OF (1713-92). British politician. Born at Edinburgh, May 25, 1713, and educated at Eton, he succeeded to the earldom in 1723. In 1750 he was appointed lord of the bedchamber to Frederick, prince of Wales, and in 1756 groom of the stole to Frederick's son, the future George III, after whose accession in 1760 Bute became his most trusted adviser.

Pitt resigned in 1761, and Bute became for practical purposes prime minister, although nominally Newcastle filled that position. In 1762 Newcastle followed Pitt into retirement, and Bute, as actual prime minister, made peace with France and Spain by the treaty of Paris. The unpopularity of this treaty caused him to resign office after ten months. He continued to influence the king until 1765, when his public power came to an end.

Bute was disliked in England chiefly because he was a king's

favourite. Moreover, he had no real ability, and the Whigs were his political enemies. He was attacked in popular lampoons, and in John Wilkes's *North Briton*. He died March 10, 1792.

Butea. Genus of Indian trees and climbing shrubs, members of the family Leguminosae, named after the 3rd earl of Bute. The principal species is the dhak-tree (*B. frondosa*) of the Bengal jungles, which furnishes a magnificent sight when in blossom, the tree appearing to be enveloped in flame. It grows to a height of 30 ft.-40 ft.; and the leaves are broken up into three roundish, silky-haired leaflets, and the pea-like orange-red flowers are produced in long sprays before the leaves appear. When the bark is incised a red astringent juice exudes, which hardens into a gum, butea-kino or Bengal-kino.

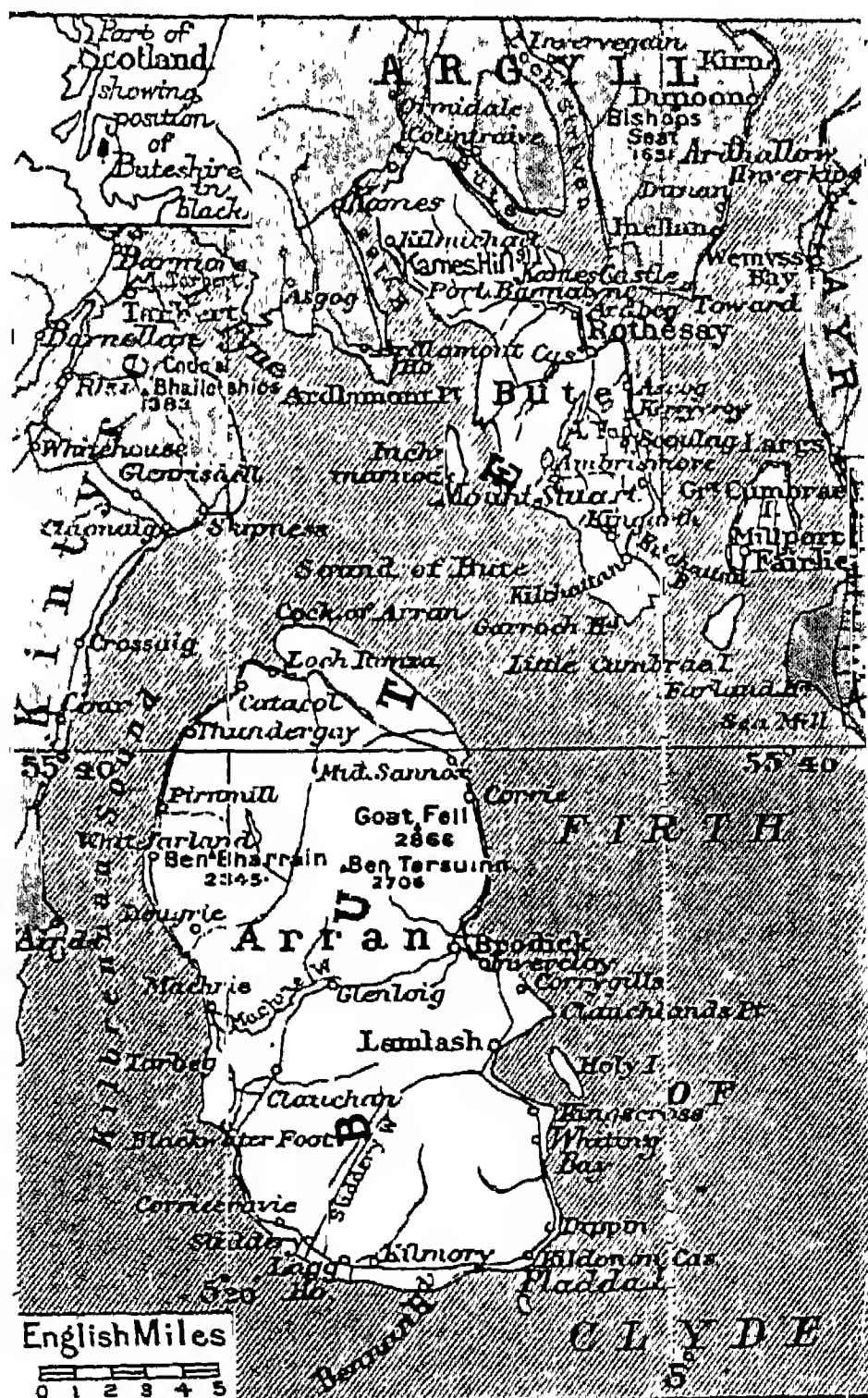
Butea is employed locally for tanning leather, which it turns to a dark colour, and it is favoured by the lac-insect. The fibres of the

bark and roots are used as a sort of oakum for caulking boats, and the seeds yield moodooga oil, used in Indian medicine as a vermifuge.

Butenandt, ADOLPH (b. 1903). German biochemist. Head of the Kaiser Wilhelm insti. for biochemistry, Berlin, he was awarded the Nobel chemistry prize in 1939 for his work on sex hormones. He was, however, obliged to refuse the prize in view of the German government's prohibitive law of 1937.

Buteshire. Small co. of Scotland. It is composed of the islands of Bute, Arran, the Cumbraes (Great and Little), Holy Isle, Inchmarnock, and Pladda, all in the Firth of Clyde, and has an area of 218 sq. m. The inhabitants are largely engaged in agriculture and fishing. Buteshire votes in the co. constituency called Bute and N. Ayrshire. The islands were wrested from the Norwegians by Alexander III in 1266.

Kames Castle was the birthplace of John Sterling, the critic, poet, and essayist. In a cottage by Loch Fad, on the Isle of Bute, Edmund Kean, the tragedian, lived for a time. Pop. (1951) 19,285.



Buteshire. Map showing the seven islands which form this Scottish county

Buthidaung. Village of Burma, in the Arakan division. It stands on the Mayu, about 15 m. N.E. of Maungdaw. The British evacuated Buthidaung in May, 1942, during the Japanese conquest of Burma. They reoccupied it in Dec., again withdrew May 8, 1943; recaptured it March 12, 1944, evacuating it May 7. On Dec. 19 it was reported, with Maungdaw, to be in Allied hands again. The tunnels of the Maungdaw-Buthidaung road through the Mayu hills were held from June, 1944.

Butler. Word derived from the French, and meaning a male servant who looks after the table. It is connected with the word bottle, and meant originally one who had charge of the wine and liquor generally. The butlers of kings and other rulers were persons of great importance, and sometimes the office became a high ceremonial one. In England the royal butler, in addition to providing wine for his master's household, looked after its importation, and received from it an import duty long known as butlerage.

Butler. Name of a famous Irish family, now represented by the marquess of Ormonde and others. The founder seems to have been Theobald FitzWalter, c. 1177, later butler to King John of England. In 1328 his descendant James was made earl of Ormonde. Other Irish titles held by the Butlers are those of earl of Ossory and Viscount Thurles; earl of Carrick and Viscount Ikerrin; Viscount Mountgarret.

Butler. Borough of Pennsylvania, U.S.A., the co. seat of



Lady Eleanor Butler and her friend, Sarah Ponsonby, the famous "ladies of Llangollen"

Butler co. It stands on Conoquenessing Creek, 30 m. N. of Pittsburgh, on the Pennsylvania and other rlys. Lying in a region rich in petroleum, natural gas, bituminous coal, and limestone, it makes steel rly. cars, glass, metal goods, and cement. It was incorporated 1803. Pop. (1950) 23,482.

Butler, BENJAMIN FRANKLIN (1818-93). American politician and soldier. Born at Deerfield, New Hampshire, Nov. 5, 1818, he became a barrister, 1840, and was elected as a democrat to the state legislature, 1853. In 1862, during the Civil War, he commanded the expedition against New Orleans, which he occupied May 1. The severity of his administration caused him to be known as Beast Butler. In Dec. he was superseded, but within a year he held another command. For neglecting Grant's orders during the

expedition against Fort Fisher in 1864 he was removed. Thereafter he devoted himself to politics. He sat in Congress as a republican, 1866-78, was Democratic governor of Massachusetts, 1882, and an unsuccessful Labour candidate for the presidency in 1884. He died Jan. 11, 1893. *Consult* Autobiography, 1892.

Butler, LADY ELEANOR (1745-1829). Irish recluse. A descendant of the second duke of Ormonde, she was a sister of the 17th earl. In 1774 or 1779, with Sarah Ponsonby, a cousin of the earl of Bessborough, she took a cottage in the vale of Llangollen, where with a maidservant they lived in seclusion for some 50 years. Known as the ladies of Llangollen, they were visited by many distinguished people. Lady Eleanor Butler died June 2, 1829.

Butler, ELIZABETH SOUTHERN THOMPSON, LADY (1846-1933). A British painter. Born at Lausanne, Nov. 3, 1846, elder daughter of T. J. Thompson, she studied painting in Florence and Rome. Her first Academy success was *The Roll Call*, 1874. *The Charge of the Scots Greys at Quatre Bras*, 1875 (in Leeds art gallery), which was highly praised by Ruskin; *Balaklava*, 1876; *Inkermann*, 1877; *The Remnants of an Army*, 1881 (in the Tate Gallery); *The Dawn of Waterloo*,



Lady Butler, British painter



Lady Butler's picture *The Roll Call*, exhibited at the Royal Academy of 1874, the first of her many battle paintings to bring her success. It depicts General Higginson and the survivors of the Guards after one of the Crimean battles. Queen Victoria stimulated interest in the artist's work by purchasing the original painting for the royal collections; it hangs in St. James's Palace, London

1895, are among her other works. In 1877 she married Sir William Butler (*q.v.*). She illustrated some of the poems of Alice Christina Meynell (*q.v.*), her sister. She died Oct. 2, 1933.

Butler, FRANK HEDGES (1855-1928). British airman. Born Dec. 17, 1855, he was for many years a violinist, and in 1894 founded the Imperial Institute Orchestral Society. He travelled widely, was an enthusiastic early motorist, made balloon ascents, and in 1901 founded the Royal Aero Club, winning its first three balloon races. Author of several books about his adventures, he died Nov. 27, 1928.

Butler, GEORGE (1774-1853). British schoolmaster. Born in London, July 5, 1774, he was educated at Sidney Sussex College, Cambridge. After a distinguished university career he was headmaster of Harrow 1805-29. In 1842 he was appointed dean of Peterborough, where he died April 30, 1853.



George Butler,
British scholar
From a drawing by
Wilkin

Butler, HENRY MONTAGU (1833-1918). British scholar. Born July 2, 1833, and educated at Harrow and Trinity College, Cambridge, he was Senior classic, and fellow of Trinity in 1855. At the age of 26 he was headmaster of Harrow, and was ordained. He left Harrow in 1885 to become dean of Gloucester, and from 1886 until his death, Jan. 14, 1918, was master of Trinity College, Cambridge.

Butler, JOSEPH (1692-1752). British theologian. Born at Wantage, May 18, 1692, the son of a retired Presbyterian draper, he early developed his theological and metaphysical interests by corresponding as a schoolboy with Samuel Clarke. Deciding to conform to the Church of England, he went up to Oriel College, Oxford, in 1714, and was ordained in 1718.



Joseph Butler,
British theologian
From an old engraving

The following year he was appointed preacher at the Rolls Chapel, London, and in 1725 rector of Stanhope in Weardale. Here he wrote *The Analogy of*

Religion, and after acting as chaplain to Queen Caroline and holding conjointly a prebend at Rochester, the rectory of Stanhope, and the bishopric of Bristol, he was in 1740 made dean of S. Paul's. Butler declined the archbishopric of Canterbury in 1747, but in 1750 became bishop of Durham. He died at Bath, June 16, 1752.

Bishop Butler's chief works are the Fifteen Sermons preached at the Rolls Chapel, 1726, and *The Analogy of Religion, Natural and Revealed, to the Constitution and Course of Nature*, 1736. In the Fifteen Sermons Butler argues for the existence of conscience as the supreme arbiter in human nature from observation, as against the utilitarian egoism of Hobbes.

In the *Analogy*, which has become a classic of English theology, Butler extends the argument of the Sermons. As human nature on examination reveals conscience, so the world of nature examined by conscience reveals a moral governor of the universe. The reasonableness first of theism, then of revealed religion and Christianity, is Butler's contention, the observed facts teaching that man, by nature punished for evil conduct and rewarded for virtue, is under probation, and that from these facts there is nothing against reason in the Christian teaching of a future life, and the justice of its awards. "Probability as the guide of life," in Butler's words, is not to be disregarded when religion is under consideration. Butler does not set out to prove the truths of revealed religion, but to show that these truths are not only not necessarily disproved by rationalist argument, but are in themselves eminently reasonable. Certain of his critics have insisted that the argument of the *Analogy* rests on the admission that the difficulties of revealed religion have their counterpart in the difficulties of natural religion, and may be used, therefore, to justify the negation of deism, which Butler sought to show was not more reasonable than Christianity, in favour of atheism. See *Analogy of Religion*; *Apologetics*.

Bibliography. Works. ed. W. E. Gladstone, 1896; J. H. Bernard, 1900; Lives, T. Bartlett, 1839; W. L. Collins, 1881; W. A. Spooner, 1901; A. E. Baker, 1923; *Ethical and Religious Theories of Bishop Butler*, W. E. Taylor, 1903.

Butler, JOSEPHINE ELIZABETH (1828-1906). A British social reformer. Born at Glendale, Northumberland, April 13, 1828, daughter of John Grey of Dilston, a political reformer and agriculturist,

in 1852 she married George Butler, principal of Liverpool College. Mrs. Butler helped to



Josephine Butler,
British social
reformer

found the N. of England council for the higher education of women. At the end of 1869 she became an active leader of the opposition to the Contagious Diseases Acts. The publicity thus secured for this cause led to repeal of the acts, 1886. She formed the London Committee for the suppression of the White Slave Traffic. Mrs. Butler died at Wooler, Northumberland, Dec. 30, 1906. She published *Personal Reminiscences of a Great Crusade*, 1896. *Consult Autobiography*, 1909; *Life*, M. Fawcett and E. M. Turner, 1928; *Portrait of Josephine Butler*, A. S. G. Butler (her grandson), 1954.

Butler, KATHLEEN TERESA BLAKE (1883-1950). British educationist. Born at Bardsea, Lancs, Sept. 26, 1883, she was educated at Hanover, Paris, and Newnham College, Cambridge, becoming a notable Italian scholar. Lecturer in modern languages at Girton College, Cambridge, 1915-42, she was University lecturer in Italian from 1926, and mistress of Girton, 1942-49. She died May 2, 1950. She published a history of French literature in 1923.

Butler, NICHOLAS MURRAY (1862-1947). American scholar. Born at Elizabeth, N.J., April 2, 1862, he graduated at Columbia College, where he became successively assistant lecturer and professor of philosophy. In 1890, when the college was made into a university, he was made dean of philosophy, and in 1901 president. Organizer and first president of Teachers College, Columbia, in 1912 he was Republican nominee for the vice-presidency. In 1931 he shared the Nobel peace prize with Jane Addams (*q.v.*). His writings include *The Meaning of Education*, 1898; *The International Mind*, 1912; *The Path to Peace*, 1930; *Family of Nations*, 1938; *Liberty, Equality and Fraternity*, 1942. He died Dec. 7, 1947.

Butler, RICHARD AUSTEN (b. 1902). British politician. Butler was born in India, Dec. 9, 1902, son of the British administrator (Sir) Montagu Butler, and edu-

cated at Marlborough and Pembroke College, Cambridge. In 1929 he was returned as Conservative



R. A. Butler,
British politician

through the Education Act of 1944. He held his seat at later elections, and in the Conservative govts. of 1951 and 1955 was chancellor of the Exchequer 1951-55, lord privy seal and leader of the House from 1955, with the additional office of home secretary in the cabinet of 1957. He was made C.H. 1954.

Butler, Sir Richard Harte Keatinge (1870-1935). British soldier. Born Aug. 28, 1870, he was educated at Harrow and Sandhurst. Entering the Dorset regiment, 1890, he served in the South African War. In command of a battalion in Aug., 1914, he was given a brigade in Nov. From Dec., 1915, he was deputy chief of the general staff Western Front. In 1918 he was put at the head of the 3rd army corps, and was knighted. He died April 22, 1935.

Butler, Samuel (1612-80). English poet. Born at Strensham, Worcestershire, where his father was a farmer and churchwarden, and educated at Worcester grammar school, he acted as a lawyer's clerk, served the countess of Kent, and Selden as secretary, and then



Samuel Butler,
English poet

From an old engraving

entered the household of Sir Samuel Luke, a Puritan and a general in the army of the Parliament. Butler was a royalist in his sympathies, but kept his own counsel until the Restoration. Then, in 1663, he published Part I of *Hudibras*, a bitter but witty metrical satire on Puritanism; Part II was printed the following year, and the last part appeared in 1678.

The original of *Hudibras* was Butler's old master, Sir Samuel Luke. The book achieved immediate popularity, especially with Charles II, but the poem

brought him no financial reward. Neither the king nor Clarendon gave Butler any employment, and he lived in obscurity and poverty, dying of consumption in London, Sept. 25, 1680. He was buried in the churchyard of St. Paul's, Covent Garden, and in 1721 a monument was erected to his memory in Westminster Abbey. *Consult* Poetical works, ed. R. B. Johnson, 1893.

Butler, Samuel (1835-1902). British author. Born at Langar, Nottinghamshire, Dec. 4, 1835, he was educated at Shrewsbury School, where his grandfather had been headmaster, and at St. John's College, Cambridge. After spending the years 1860-64 on a New Zealand sheep-run, he resided for the rest of his life in chambers in London, making annual excursions to N. Italy and Sicily.

A thinker, interested in art, science, and music, a painter, and a scholar, Butler exhibited in the Royal Academy for several years, and one of his best pictures, *Mr. Heatherley's Holiday*, 1874, is in the Tate Gallery, while many of his drawings are in the British Museum. His principal writings are *Erewhon*, 1872, a



Samuel Butler,
British author
Nat. Portrait Gallery

Utopian romance criticising Darwinism and orthodox Christianity; its sequel, *Erewhon Revisited*, 1901, a satire on the origins of popular religions; *The Way of All Flesh*, an autobiographical novel, published posthumously in 1903; topographical books on the Alps; and a biography of his grandfather. Butler's objection to Darwinism was its omission of a directing mind from the universe. His view that the author of the *Odyssey* was a woman was expressed in *The Authoress of the Odyssey*, 1897. Butler died June 18, 1902. *Consult* S.B., H. F. Jones, 1903; S.B., a Critical Study, C. E. M. Joad, 1924; *Life*, P. Henderson, 1953.

Butler, Count Walter (d. 1634). Irish military adventurer. Of the family of the earls of Ormonde, he fought at Prague, 1620, and was mentioned for valour at Frankfort-on-Oder, 1631, when he was captured by Gustavus Adolphus. Buying his release, he joined

the imperial army in Silesia, and in 1632 was sent by Wallenstein to defend his duchy of Sagan against the Saxons. On Wallenstein's desertion of the emperor, Butler arranged that Wallenstein and his staff should be killed. This was done at Eger, Feb. 25, 1634, to the great satisfaction of the emperor, who made Butler a count and gave him his regiment of Irish dragoons and the estate of Friedberg. Butler died near Schorndorf, Dec. 25, 1634.

Butler, Sir William Francis (1838-1910). British soldier and author. Born at Suirville, Tipperary, Oct. 31, 1838, of Irish parentage, he entered the army 1858, and saw service in the Red River Expedition, 1870-71; the Ashanti War, 1873-74; and the Sudan Campaign, 1884-85. He was in command of the British forces in South Africa in 1898-99, but, holding that war with the Boers could be avoided, he resigned in July, 1899, and was appointed to the command of the western district, which he held until 1905. He died at Tipperary, June 7, 1910. His publications include *The Great Lone Land*, 1872; *Charles George Gordon*, 1889; *Sir Charles Napier*, 1890. In 1877 he married Elizabeth Thompson, who as Lady Butler was famous as the painter of battle pictures.



Sir William Butler,
British soldier

Butlerage. Duty on wines formerly levied at English ports, also called prisage. It is defined by Blackstone as "a right of taking two tuns of wine from every ship importing into England twenty tuns or more." By Edward I this duty in kind was changed into one of 2s. for every tun imported by merchant-strangers. Called butlerage because it was paid to the king's butler, this duty was abolished in 1809.

Butlin, William Edmund (b. 1900). British business man. Born in S. Africa, educated in Canada, he came to England at 15 as a Canadian soldier



William Butlin,
British business man

Butlin, William Edmund (b. 1900). British business man. Born in S. Africa, educated in Canada, he came to England at 15 as a Canadian soldier

in the First Great War. Trained as a commercial artist, he acquired a hoop-la stand at a fair in 1921, and in 1938 was granted the whole concession for the fun fair at the Glasgow exhibition. Butlin exploited the holiday camp (*q.v.*) From his original camp at Skegness the venture spread all round the coast, about 100,000 people annually spending their holidays in this way. The camps were taken over by the government at the outbreak of the Second Great War, and in 1941 Butlin reorganized the hostels established by the ministry of Supply. He joined N.A.A.F.I. as an honorary director in 1944 and opened recreation centres for the British army in Belgium.

Buto. Snake goddess of ancient Egypt, who was worshipped at a city of the same name on the Nile delta. The hawk and the shrew mouse were also sacred to her, and her cobra emblem was Pharaoh's diadem. See *Uraeus*.

Buton OR **BOETON**. Island, town, and strait of Indonesia, situated south-east of Celebes. The strait, 15 m. to 20 m. wide, separates Buton from Celebes and Muta Muna. The island, 1,650 sq. m. in area, is rich in asphalt. The town is on the S.W. coast of the island. Most of the people are Malays.

Butrinto (anc. *Buthrotum*). Small coast town in S. Albania, facing Corfu, said to have been founded by Helenus, son of Priam, after the Trojan War. Virgil, in the *Aeneid* (book III, 293) brings Aeneas here to visit Helenus. It was of some importance in Greek and Roman times, and again under the Byzantines and Venetians; the Venetian castello remains. Italian archaeologists conducted excavations here in 1928 and succeeding years, and uncovered a number of fine buildings.

Butt, SIR ALFRED (b. 1878). English theatrical manager and politician. Butt was born March 20, 1878, and was managing director of the Palace Theatre, 1906-20. After various ventures he became managing director and chairman of the Theatre Royal, Drury Lane, 1925, producing such spectacular musical plays as *Rose Marie*, *Show Boat*, and *The Three Musketeers*. Butt resigned in 1930. He was director of rationing at the ministry of Food, 1917-18, and Conservative member for Balham and Tooting, 1922-36, resigning his seat in the latter year following the Budget leakage scandal. Butt was knighted in 1918 and made a baronet in 1929.

Butt, DAME CLARA (1873-1936). British singer. Born at Southwick, Sussex. Feb. 1, 1873, she studied at the Royal College of Music. She made her debut in Sullivan's *Golden Legend* at the Albert Hall Dec. 7, 1892, and appeared with remarkable success in Gluck's *Orpheus*, given by the students of the college. Though her repertoire was limited and her presentation wanting in art, the magnificent natural quality of her contralto made her a popular singer of ballads, *e.g.* *Land of Hope and Glory*, all over the British Empire. In 1900 she married Kennerley Rumford, baritone, and organized concerts with him. She was created D.B.E. for war services, 1920. She died after a long illness on Jan. 23, 1936. Her life story by Winifred Ponder was published 1928.



Dame Clara Butt,
British singer
Russell

Butt, ISAAC (1813-79). Irish politician. Born at Glenfin, co. Donegal, Sept. 6, 1813, the son of a Protestant clergyman, he was educated at Raphoe and Trinity College, Dublin. Here in 1836-41 he was professor of political economy, and was one of the founders



Isaac Butt,
Irish politician

of the Dublin university magazine, which he edited 1834-38. Called to the Irish bar in 1838 and the English bar in 1859, he defended Smith O'Brien and the other prisoners in the state trials of 1848, and the Fenian prisoners 1865-69. In 1852 he was elected Conservative M.P. for Harwich, and sat as Liberal Conservative M.P. for Youghal, 1852-65. Elected M.P. for Limerick 1871 as the leader of a new Home Rule party, he popularised the term "Home Rule." He died near Dundrum, May 5, 1879.

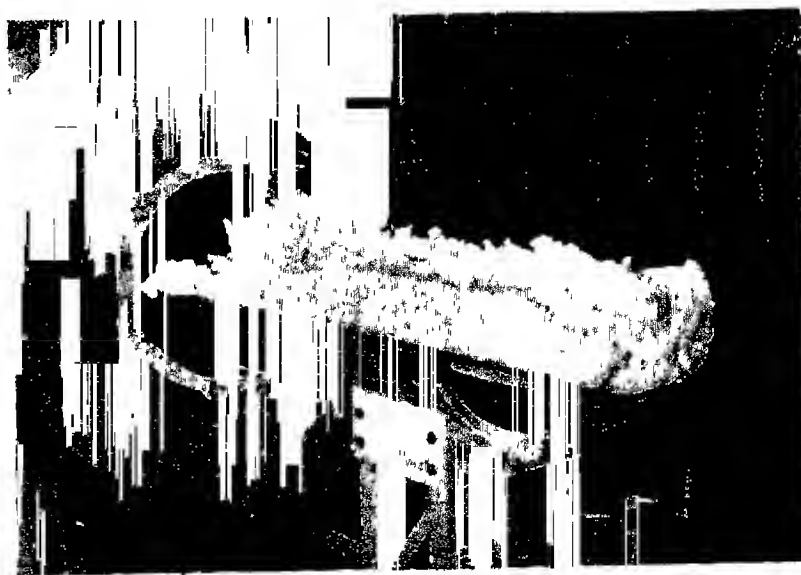
Butte (Fr., *hillock*). Flat-topped hill common in plateau regions. Plateaux are dissected by rivers into large tabular-shaped blocks called *mesas* (tables); a

butte is a small detached portion of a *mesa*. The names *mesa* and *butte* are used in the western states of the U.S.A., where these flat-topped hills lend themselves very well to the fortress-like *pueblos* in which many Indian tribes live (see *Kopje*; *Tor*). The term is also used in France, and during the First Great War a number of these hills were prominent in the fighting.

Butte. City of Montana, U.S.A., the co. seat of Silverbow co. Situate in a range of the Rocky Mts. 5,760 ft. high, it is 50 m. S.W. of Helena, and is served by the Chicago, Milwaukee and St. Paul, and other rlys. Butte has large copper smelting works owned by the Anaconda Mining co., which also owns or leases the copper, zinc, silver, etc., mines of the area. Production of copper ore is declining, and so is the pop. of Butte. Here is the state school of mines. Settled during the gold rush of 1864, Butte became a city in 1879. Copper was discovered in the 1880s, after the gold had given out. Pop. (1950) 33,251.

Butter. Product made from the fat of mammals' milk, usually cows. The average fat percentage of cows' milk varies from 3 to 5. Cream is separated from the milk by centrifugal force or gravity, and this cream, containing the fat, is agitated, causing the fat globules to mass together to form butter. The serum left is buttermilk. The butter is washed free of buttermilk, worked to expel excessive moisture, and salted to market requirements. The finished product contains approximately 84 p.c. fat, 16 p.c. water, salt, etc. By law, the maximum water allowed in butter is 16 p.c.

Butter can be made from sweet cream or ripened cream. Sweet cream butter has a mild flavour, but keeps well under cold storage conditions, a factor recognized by the ministry of Food. Ripened



Butter. Emergence of butter from a mechanical churn in a Cornish factory
Photo, Milk Marketing Board

cream butter is fuller flavoured. The cream, after heat treatment and cooling, is inoculated with lactic organisms, the flavour thus produced being absorbed by the fat. For both sweet cream and ripened cream butter, heat treatment of the cream, followed by cooling, is desirable in order to produce a butter of good flavour and keeping quality.

Careful control of milk and cream production and of the manufacture of the butter is essential to produce a uniform product which commands a good market. Grading of the butter after storage is desirable. The quantity of milk required to make a pound of butter varies with the fat content of the milk. Many factors, such as breed of cattle, time of year, and lactation period, affect the milk constituents. About one pound of butter is made from $2\frac{1}{2}$ galls. of milk, of which the fat content is 3.6 p.c.

Butter-bur (*Petasites hybridus*). Perennial herb of the family Compositae. It is a native of Europe,



Butter-bur stem and leaves

N. Africa, and N. and W. Asia. From a stout, fleshy, creeping rootstock the flower stem arises in March, crowned by numerous clusters of flesh-coloured or pale purple flowers. With a few exceptions, the flowers produced on one plant are all male or all female. The leaves are thrown from the rootstock a little later, and expand to a diameter of 3 ft. They vary between kidney-shape and heart-shape, and are white with cottony down on the underside.

Buttercup (*Ranunculus*). Perennial herb of the family Ranunculaceae, several species being united popularly under one name.

Meadow buttercup (*R. acris*), a native of Europe and N. Asia, has roundish leaves divided into three to seven lobes, and golden-yellow flowers opening widely. Creeping buttercup (*R. repens*), a native of Europe, N. and W. Asia, and N. Africa, has long above-ground runners, and the oval leaves are deeply divided into



Buttercup, flowers and stalks

three wedge-shaped segments. The flowers are cup-shaped. Bulbous buttercup (*R. bulbosus*), a native of Europe, Asia, and N. Africa, has a turnip-shaped rootstock, 1 in. across, three-lobed variable leaves, and cup-shaped flowers. All the species have acrid juices, and are distasteful to browsing animals.



Butter. Future dairy-maids being instructed in buttermaking at the Lanes. county council dairy school, near Preston

Butterfield, DANIEL (1831-1901). American soldier. Born at Utica, New York, he was in business when the Civil War broke out. He then joined the Federal army and was soon at the head of a brigade and later of an army corps. He was chief of the staff to Hooker, and as such had a share in the battle of Chancellorsville and in several campaigns. After the war Butterfield commanded the troops in New York City, but in 1870 he returned to commercial life. He died July 17, 1901.

Butterfield, WILLIAM (1814-1900). British architect. Born in London, Sept. 7, 1814, his early acquaintance with Worcester cathedral attracted him to the study of English medieval architecture. His first important commission was the re-erection of S. Augustine's College, Canterbury, 1845, and he soon became architect of several churches, including All Saints', Margaret St., 1859, and S. Alban's, Holborn, 1863. Other characteristic works were the new buildings at Merton College, Oxford, 1864; the chapel and school buildings at Rugby, 1875; and Keble College, Oxford, founded 1870. Butterfield generally aimed at an exuberant colour scheme by the juxtaposition of variously coloured bricks or bricks and marble. He died Feb. 23, 1900.

Butterfly. Known scientifically as Papilionoidea or Rhopalocera, butterflies form one of the main divisions of the order Lepidoptera; the other divisions comprise the moths. The antennae of a butterfly are clubbed or swollen at their apices, whereas among moths they are thread-like or branched and feathery. In some moths, however, they are clubbed, but the linking together of the wings of a side by a bristle, or group of bristles, serves to distinguish them from butterflies. A butterfly is active during sunshine and, when at rest, usually closes its wings vertically so that only the underside is visible. Most (but not all) moths fly at dusk or at night. When at rest, they generally close the upper wings over the lower pair.

Most butterflies have the wings more or less thickly covered with minute scales, often iridescent or metallic in hue. A large number of these insects are brilliantly coloured, but this coloration is confined to the upper surface. The underside is commonly protectively coloured so that the insect when at rest resembles a leaf or some other part of its immediate surroundings. In moths the upper side of the wings is protectively coloured.

Butterflies exist in all parts of the world except the Antarctic region and the summits of the highest mountains. The largest variety of kinds is to be found over hill-sides, heaths, marshlands, and wooded country. Butterflies mainly feed on the nectar of flowers. Their mouth-parts are elongated, and greatly modified to form a sucking tube or proboscis through which they take in their food. When not in use, the proboscis is coiled up in a watch-spring-like manner under the head. In the adult stage these insects are harmless, and even useful in transferring pollen from one flower to another. In the caterpillar stage, however, some kinds are injurious, and in Great Britain the Large and Small Whites are destructive to vegetables of the Brassica kind.

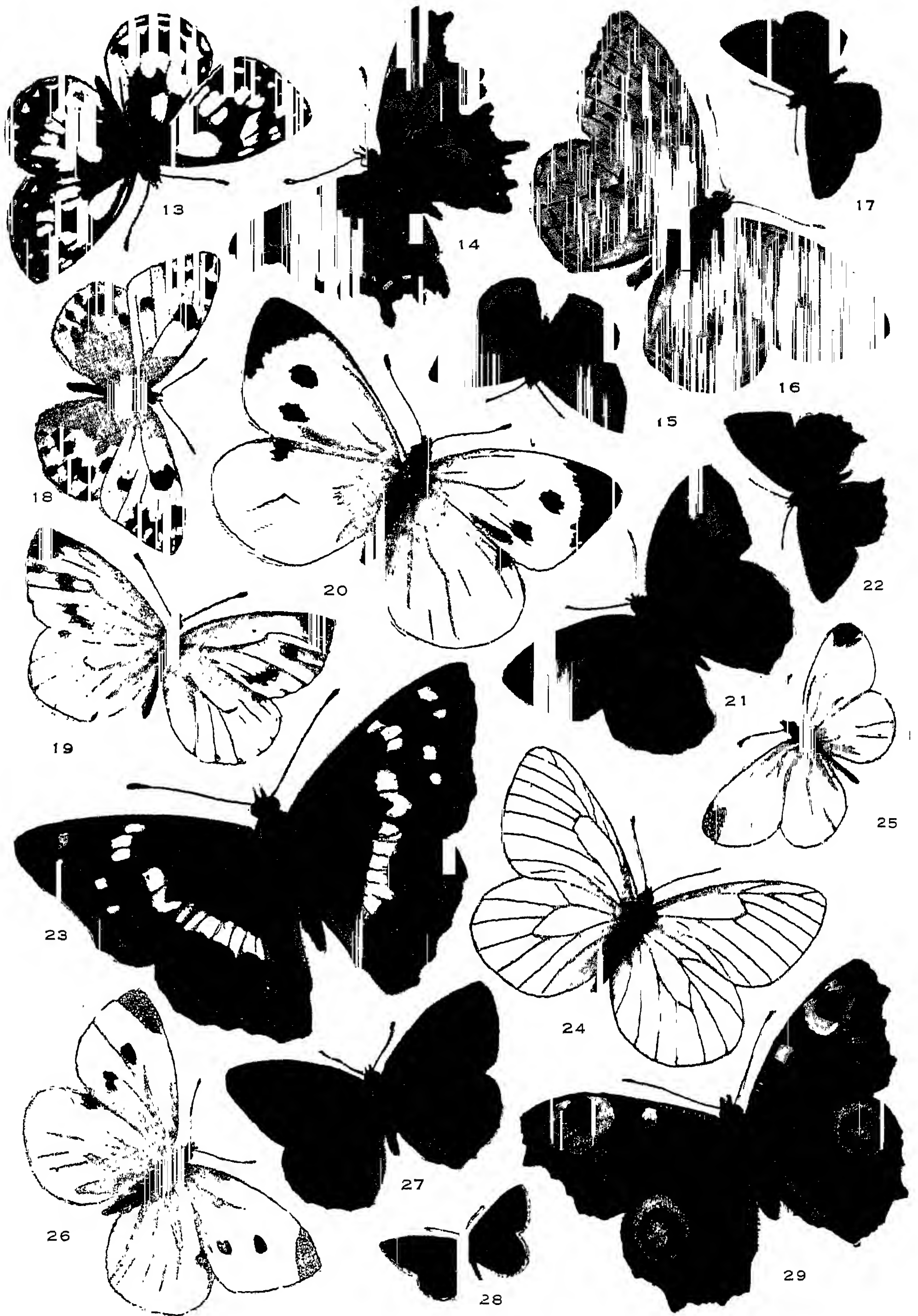
The life of many butterflies lasts only a few weeks, except for those that hibernate in the adult condition. Thus the small Tortoiseshell,



1. Small Meadow Brown. 2. Chitden or Adonis Blue.
3. Clouded Yellow, male. 4. Clouded Yellow, female.
5. Swallowtail, underside. 6. Swallowtail. 7. Silver-

washed Fritillary, underside. 8. Silver-washed Fritil-
lary. 9. Red Admiral. 10. Red Admiral, underside.
11. Small Tortoiseshell. 12. White Admiral

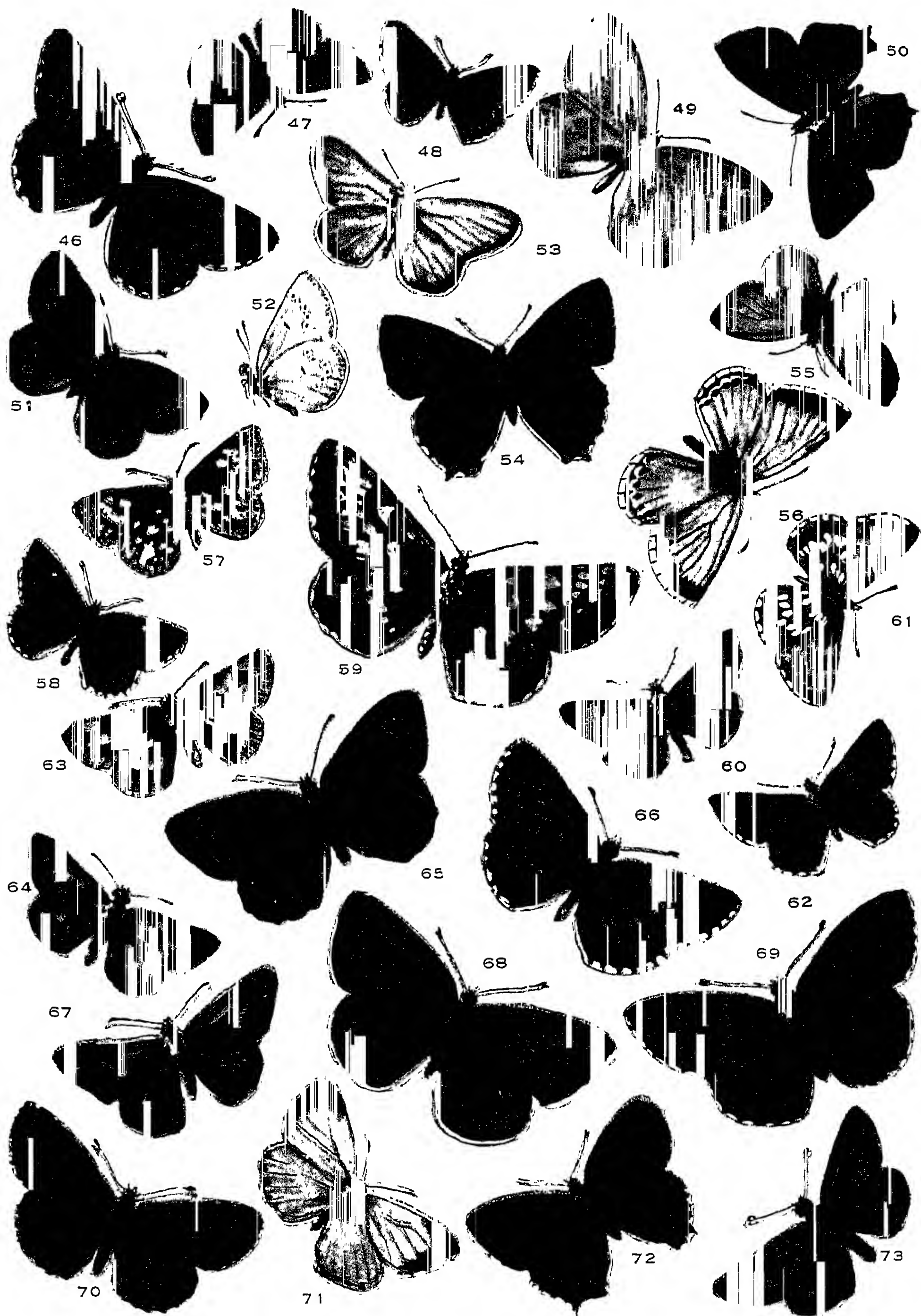
BUTTERFLIES: EXACT REPRODUCTIONS IN COLOUR OF ALL THE BRITISH SPECIES



13. Marbled White. 14. Comma. 15. Small Copper. 16. High Brown Fritillary. 17. Dingy Skipper. 18. Bath White. 19. Green-veined White. 20. Large White. 21. Meadow Brown. 22. Green Hairstreak. 23. Purple Emperor. 24. Black-veined White. 25. Wood White. 26. Small White. 27. Ringlet. 28. Bedford Blue. 29. Peacock



30. Grizzled Skipper. 31. Dark Green Fritillary. 32. Common Blue. 33. Purple Hairstreak. 34. Grayling. 35. Brimstone. 36. Large Tortoiseshell. 37. Silver-studded Blue. 38. Speckled Wood. 39. Orange Tip. 40. Pale Clouded Yellow. 41. Large Blue. 42. Camberwell Beauty. 43. Painted Lady. 44. Wall. 45. Queen of Spain Fritillary.



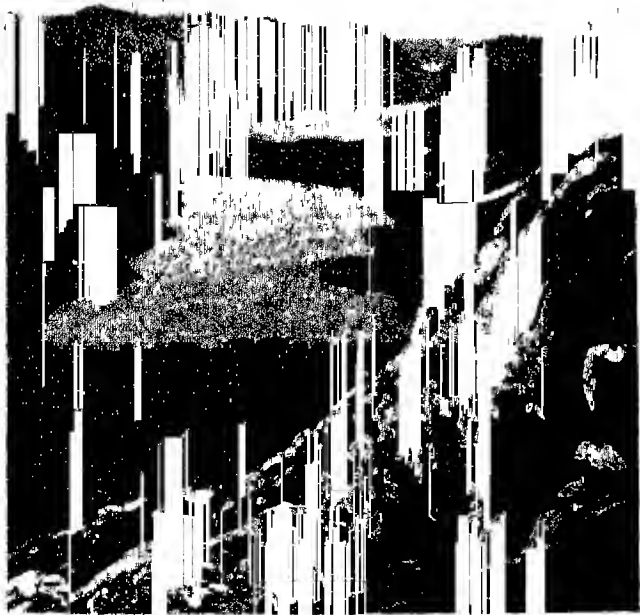
46. Glanville Fritillary. 47. Lulworth Skipper. 48. Brown Argus. 49. Large Heath. 50. White Letter Hairstreak. 51. Small Ringlet. 52. Mazarine Blue, underside. 53. Mazarine Blue. 54. Brown Hairstreak. 55. Small Heath. 56. Chalk Hill Blue. 57. Scotch Brown Argus, underside. 58. Scotch Brown Argus. Blue. 72. Black Hairstreak.

59. Marsh Fritillary. 60. Small Skipper. 61. Burgundy Fritillary, underside. 62. Burgundy Fritillary. 63. Chequered Skipper, underside. 64. Chequered Skipper. 65. Scotch Argus. 66. Heath Fritillary. 67. Large Skipper. 68. Large Copper. 69. Pearl-bordered Fritillary. 70. Small Pearl-bordered Fritillary. 71. Holly. 73. Silver-spotted Skipper.

Peacock, and Brimstone hibernate in autumn and remain in a torpid condition during winter until they awaken and lay their eggs during the following spring. They are, however, often seen on the wing during temporary warm spells in winter. Other kinds hibernate in the egg stage; many others live through the winter as caterpillars and several, including the common Whites, do so in the chrysalis stage. The term chrysalis refers in particular to the metallic-looking pupae of certain species, but has come to have a wider meaning.

Several British butterflies, including the Whites and Holly Blue, are double-brooded, while the Small Copper usually has three broods in a year. Among some species the sexes vary greatly in size and coloration. Among the Blue butterflies, for instance, the males are brilliant blue and the females mostly of a dull brownish hue. In Great Britain there are not more than 68 different kinds of butterfly: these are classified into six families as follows:—The *Papilionidae* are represented by the handsome Swallow Tail, confined to the Broads and Wicken Fen; the *Pieridae* include the Whites, Orange Tip, and Clouded Yellows; the *Nymphalidae* are the largest family, and comprise the Tortoiseshells, Peacock, Fritillaries, Meadow Brown, etc.; the *Nemeobiidae* include only the local Duke of Burgundy Fritillary; the *Lycuonidae* comprise the Blues and Hairstreaks; and the Skippers form the family *Hesperiidae*. See colour plates.

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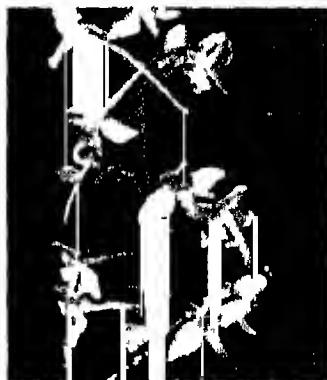
Buttermere. One of the smaller lakes in Cumberland. It is surrounded by high fells

Butterfly Fish. Popular name for the chaetodonts (*q.v.*).

Butterfly Flower. Popular name for *Schizanthus*, a genus of 11 species of annual plants of the family Solanaceae, native to Chile. They have long, narrow, much dissected leaves and showy flowers, for the sake of which some of the species are grown in gardens as hardy or half-hardy annuals.

Butterfly Orchid. Name given to two orchids of the genus *Platanthera*, family Orchidaceae.

The lesser butterfly orchid (*P. bifolia*) and the greater butterfly orchid (*P. chlorantha*), which both occur in Great Britain on calcareous soils, are native to Europe and northern Asia. They have two egg-shaped tubers from which are borne two oval or oblong leaves, and a tall stem bearing a number of small leaves and large, white, fragrant flowers, which resemble a crowd of white butterflies.



Butterfly orchid, *Platanthera bifolia*

Butterfly Plant. Popular name given to two orchids. (1) *Oncidium papilio*, from Trinidad, the large yellow and red flowers of which, as they sway on their slight stalks, bear a resemblance to fluttering butterflies. (2) The epiphyte, *Phalaenopsis amabilis*, or Indian butterfly plant.

Butterfly-weed (*Asclepias tuberosa*). Perennial herb of the family Asclepiadaceae. A native of N. America, with scattered, oblong, lance-shaped, hairy leaves and showy, bright orange flowers, it is cultivated in European gardens as a border plant. Known also in America as pleurisy-root, it is used medicinally as a mild purgative. See Swallow-wort.

Butterine. Term at first employed in England to describe butter substitutes prepared from animal or vegetable fats. The use of this word for the purpose was forbidden as the substitute was frequently sold for the real article, and the material came to be known as margarine (*q.v.*).

Buttermere. Parish, village, and lake of Cumberland, England. The lake is $1\frac{1}{2}$ m. long, $\frac{1}{2}$ m. broad, and has a greatest depth of 93 ft.

Buttermilk. Liquid remaining after whole milk or cream is churned and the fat collected into butter. Butter is always manufactured from cream in commercial butter making. Buttermilk con-

tains a percentage of milk solids but a low fat, approximately 0.1–0.5 p.c. On the farm it can be used for stock feeding and cooking; commercially it is dried and the milk solids used for food stuffs. See Butter; Dairy-Farming.

Butter Nut (*Juglans cinerea*). North American tree, known also as white walnut and oil nut. It grows to a height of 30 ft., and its nuts are used medicinally by the N. American Indians as a purgative. An extract, juglandin, made from the root bark, is a liver stimulant and cathartic.

Butter-tree (*Bassia butyracea*). Tree of the family Sapotaceae, a native of Nepal, India. It has leathery, undivided leaves and fleshy whitish flowers, which are succeeded by pulpy fruits in which the seeds are embedded. These seeds when pressed yield a white fatty substance like lard. The allied mawha-tree (*B. latifolia*), a native of Bengal, yields a similar substance. The flowers are employed as food, and from their juices a kind of arrack is distilled. The African butter-tree or shea-tree, mentioned by Mungo Park as producing Galambutter, is *B. parkii*, the seeds of which are boiled for the butter.

Buttertubs Pass. Hill road in the N. Riding of Yorkshire, England, between Hawes in Wensleydale and Muker in Swaledale. Its alt. is 1,726 ft. and the splendid view of mountains and hills takes in Ingleborough to the S. The Buttertubs are four deep holes in the limestone beside the road near the highest point 3 m. from Muker and $4\frac{1}{2}$ m. from Hawes.

Butterwort (*Pinguicula vulgaris*). Stemless perennial herb of the family Lentibulariaceae, native of Europe, N. Asia, and N. America. The leaves are succulent, smooth, and oblong, lying on the ground in a rosette 5 ins. or 6 ins. across, from whose centre



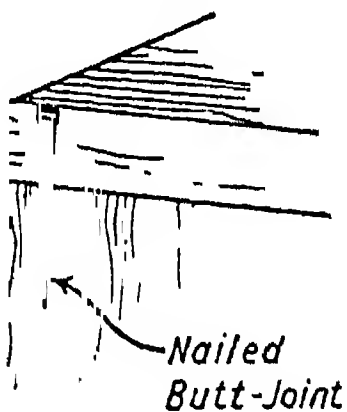
Butterwort, *Pinguicula vulgaris*

arise several leafless stalks, each supporting a solitary violet flower. The leaves have glands which pour out a greasy fluid in which insects are caught and digested, the incurved edges preventing the fluid running off. This substance is used by the Laplanders to curdle milk without producing cream or whey. Butterwort inhabits bogs and wet mountain sides.

Buttevant. Parish and small market town of co. Cork, Irish Republic. It is on the river Awbeg, 28 m. N.W. of Cork. The Mulla of Spenser, it has remains of an abbey; Kilcolman Castle, the residence of the poet 1587-98, is 3 m. to the N.E. Market days, Tues. and Fri.

Butti, ENRICO ANNIBALE (1868-1912). An Italian dramatist and novelist. Born at Milan, Feb. 19, 1868, he published his first novel, *L'Automa*, in 1892, and in 1893 his first play, *Il Vortice*, was produced at Turin. Of his other plays, three deserve mention: *La Corsa al Piacere*, 1900; *Lucifero*, 1901; and *La Tempesta*, 1902. He died Nov. 26, 1912.

Butt Joint. A joint in which the members are merely butted together, instead of being lapped,



Butt Joint, used in carpentry

scarfed, or notched. In woodwork butt joints are used for rough work and afford comparatively little strength and rigidity as compared with lapped or tenoned joints. But such simple joints are used for obtaining the needed width for articles like table tops, etc., the edges of adjacent boards then being glued and cramped tightly until the glue has set.

Button (Fr. *bouton*). Disk for fastening one part of a garment to another. Buttons were used from the earliest times; they have been found among prehistoric remains in Britain, and were used in Egypt from the VI to the XIX dynasties. Early buttons were generally made of gold, silver, or pearl, ornamented with designs and inlaid with precious stones. It was not until the middle of the 17th century, when Birmingham commenced the manufacture of cheap brass buttons, that they came into general use amongst all classes of the community.

Nowadays a great variety of materials are used in button-making: fresh-water mussel shells,

ocean shell, steel, brass, iron, vegetable ivory, glass, porcelain, agate, leather, celluloid, cardboard, bone, hoof, horn, rubber, etc. Large quantities of shirt buttons are made from powdered tale mixed with glass, baked in moulds and polished. A recent development has been the manufacture of buttons from plastics such as casein (*q.v.*).

Fresh-water pearl buttons are produced in enormous quantities in the U.S.A., where they are made from the mussel shells of the Mississippi river. Others are made in Austria, Hungary, and Germany. Ocean pearl buttons, used extensively for shirts and underwear, are mostly manufactured from white shell from W. Australia, black shell from Tahiti, and yellow shell from the Philippines. They are made by machines which cut out the button pieces from the shell with tubular saws, split them into disks, drill the holes, and smooth and polish them. Vegetable ivory buttons are made from the corozo nut grown in Panama, Ecuador, and Colombia.

Metal buttons are made from sheet metal which is passed through presses to cut out the blanks and stamp the pattern on them. Metal buttons for uniforms are made in two pieces, the back and front, which are then nipped together in a clamping machine. Bone buttons are mainly manufactured from the shin bones of cattle; the process being the same as that used for shell buttons. Silk-covered buttons were introduced in the reign of Elizabeth, but the cloth button was not made on any large scale until the 19th century. The three-fold linen button for underclothes was introduced in 1841.

Glass buttons of great beauty and variety are made in Czechoslovakia, which is also the seat of the porcelain button industry, though the latter were first produced by an Englishman in 1840. Shoe buttons are mostly made from papier mâché coated with amber varnish and baked. The U.S.A., Great Britain, France, Germany, and Czechoslovakia are the principal makers of buttons.

Certain buttons on present-day dress are vestiges of past use.

Those above the tails of a man's morning coat are a survival of those once used to fasten up the long skirts when riding, and the buttons on jacket sleeves were originally used to fasten back long cuffs. In China, buttons are worn on the hat as a badge of rank or social status. In the U.S.A. cuff-links and collar-studs are generally styled buttons.

Buttress (Fr. *bouter*, to thrust). In architecture, a pier or other mass of masonry, brickwork or concrete built up against the exterior surface of a wall, to strengthen it where the lateral pressure of the roof calls for resistance. Almost the oldest form of buttress is the flat-faced pier attached to the walls of Romanesque churches. Occasionally this is ornamented with small cylindrical moulding at the angles. But the walls of Romanesque churches were thick, with the minimum of window space, and the buttress was hardly needed.

The adoption of the Pointed style led to the development of this feature during the first or lancet period (1180-1250). More solid buttresses being required to withstand the increased outward and downward thrust of the roof against walls weakened by larger openings for windows, the buttress became a vital structural element. With increased size and strength came a greater measure of decoration. The buttresses of many great churches are of highly enriched design, with bold mouldings, mitres, panelling, crockets, and finials on the pinnacles; and it must be remembered that the pinnacles, far from



Buttress. Examples in British architecture. 1. Fotheringay, Northamptonshire, circa 1440. 2. Divinity school, Oxford, circa 1490. 3. Hartlepool church, Durham, 1250. 4. Orton-on-the-Hill church, Leicestershire, circa 1830. 5. Gloucester cathedral, 1430

being merely ornamental, had a structural function, exerting a downward pressure to counteract the outward thrust of the roof.

Massiveness was at first the characteristic in the 13th century, which was the great period in the history of the buttress, but as architectural knowledge increased an appearance of lightness and grace was secured without the sacrifice of strength. The flying buttress, evolved in France, quickly attained the summit of architectural beauty while performing an important constructional function. Westminster Abbey has fine examples of this kind of buttress.

During the 14th century the importance of the flying buttress began to wane. It was found possible to counter the outward thrust of the vault over the nave by the inward thrusts of the aisle vaults, at any rate in buildings where the span of the nave and that of the aisles were about the same. Where the span of the nave was much greater than that of the aisles, as in Bristol cathedral, the vaults of the nave were reinforced by a transom put across the vault.

Butuan OR AGUSAN. Largest river of Mindanao, Philippine Is. Rising near Pujada Bay, it flows N. to Butuan Bay. Length 160 m.

Buturlinovka OR PETROVSKOI. Town of Russia, in the region of Voronezh, 33 m. S.E. of Bobrov. There are sulphur springs; and it has flour mills, tanneries, and tallow works.

Butyl. Name given to a kind of synthetic rubber produced by uniting butadiene with isobutylene. See Rubber.

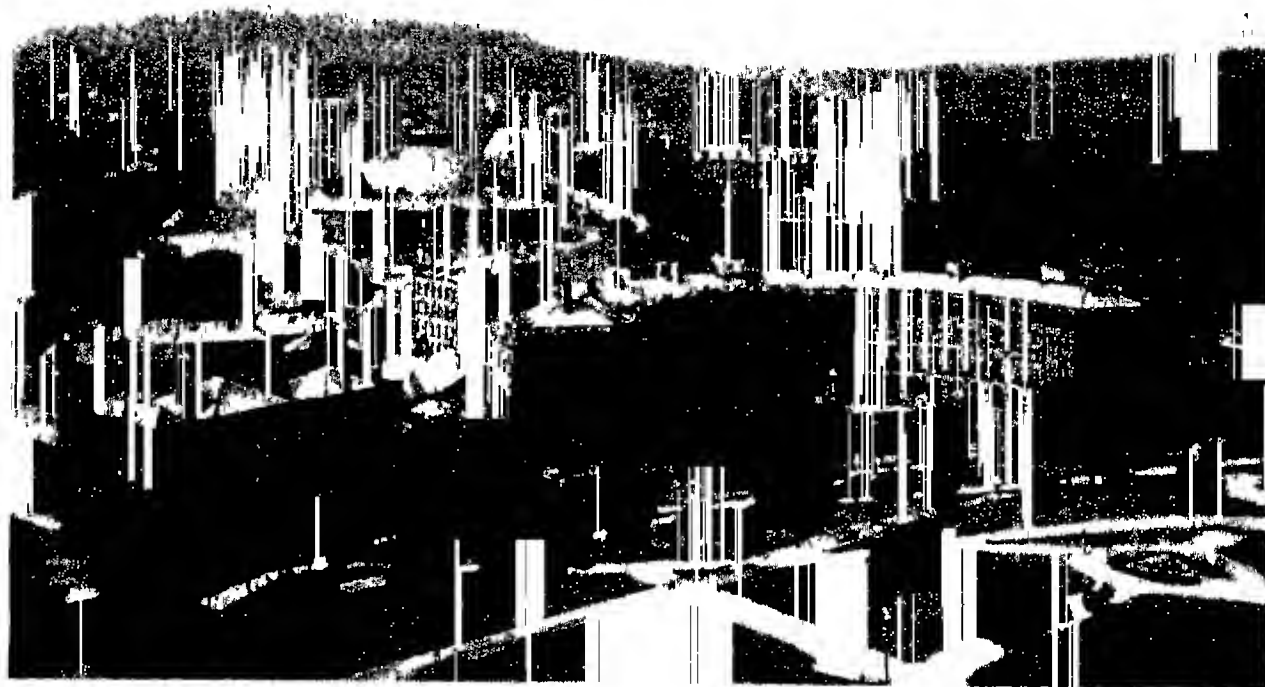
Butyl Acetate. Colourless liquid made from butyl alcohol, having a nauseating odour. It is used as a solvent for lacquers.

Butyl Alcohols. There are four isomeric alcohols of the formula $C_4H_{10}O$; three are colourless liquids and the fourth a solid. (1) Normal butyl alcohol or butanol occurs in the heavy oil from brandy and may be obtained when starch is fermented with a special bacillus, acetone being formed at the same time. It may also be made synthetically and is used as a solvent in various industries; (2) isobutyl alcohol or fermentation butyl alcohol obtained in rectifying potato spirit, with an odour which suggests that of the syringa; (3) secondary butyl alcohol or methyl-ethyl carbinol, which smells like acetone; (4) tertiary butyl alcohol or trimethyl carbinol, which has a camphor-like odour.

Butyl-Chloral. Oily pungent liquid, formerly known as croton chloral, obtained by passing chlorine into paraldehyde and heating the butyl chloral hydrate which forms in a stream of hydrochloric acid. Butyl chloral hydrate, $C_4H_7Cl_3O_2$, is a white solid which crystallises in silky scales and is used as a remedy for neuralgia of the face and head.

Butylenes. Colourless hydrocarbon gases (C_4H_8) existing in three isomeric forms and present in the gas from "cracking" petroleum; or they may be made from butyl alcohols. Butylenes are of industrial importance in connexion with the manufacture of synthetic rubber and high-octane aviation fuels.

Butyric Acid (Latin *butyrum*, butter). Liquid acid which Chevreul first separated from butter.



Buxton, Derbyshire. View showing the Crescent, in which are most of the spa establishments, and beyond it the dome of Devonshire Royal Hospital

It occurs in a variety of animal fats and vegetable products, and is a result of fermentation. It may be made by Bensch's process, which consists in fermenting for about six weeks a mixture of sugar, tartaric acid, putrid cheese, sour skimmed milk, and chalk. An isomeric acid, called isobutyric acid, is made by acting on isobutyl alcohol with bichromate of potash. Both acids have unpleasant odours.

Butyric Ether. Liquid which smells like pineapple and is obtained by warming together a mixture of alcohol, butyric acid, and sulphuric acid. When one part of butyric ether is diluted with ten parts of spirit it is known as pineapple essence, and is used for flavouring confectionery and for preparing artificial rum.

Buxar. Variant of the name of the Indian town Bazar (*q.v.*).

Buxtehude, DIETRICH (1637-1707). Danish composer and organist. Born at Helsingør (El-

sinore), Denmark, he was organist of the Marien-Kirche at Lübeck from 1668 until his death. In 1673 he established his popular Advent musical service for organ, chorus, and orchestra. He wrote cantatas and organ music. He died at Lübeck May 9, 1707.

Buxton. Borough, market town, and health and holiday resort of Derbyshire, England. Situated 1,000 ft. a.s.l., the highest town of its size in England, it is 25 m. S.E. of Manchester. Its mineral springs were known to the Romans. The spa establishments, owned and controlled by the corporation, consist of the physical treatment centre for arthritis, rheumatism, and allied conditions, the after effects of bone injury, and debility following long illness; St. Ann's Well, where radio-active mineral waters issue



Buxton arms

through fissures in limestone rock from springs yielding a quarter of a million gallons a day, at a constant temperature of 82° F.; and

the natural baths, with three swimming pools supplied from the warm waters of the springs. These establishments are situated in and about the Crescent, planned in Palladian style by

the 5th duke of Devonshire in 1780. Devonshire royal hospital has one of the widest domes in the world (154 ft.); it was converted from a riding school by the 6th duke of Devonshire in 1858.

Buxton has excellent hotels and many conferences are held here. It has extensive gardens, and its

entertainments include drama and music festivals, bowls and croquet tournaments. Near by are Peak district national park, Chatsworth (home of the dukes of Devonshire), Haddon Hall, Hardwick Hall, and the Derbyshire dales. Buxton, which is in High Peak county constituency, was incorporated in 1916. Market day, Sat. Pop. (1951) 19,568.

Buxton, SYDNEY CHARLES BUXTON, EARL (1853-1934). British politician. Born Oct. 25, 1853, and educated at Clifton and Trinity College, Cambridge, he was elected Liberal M.P. for Peterborough in 1883. He was M.P. for Poplar 1886-1914, and postmaster-general 1906-10, when he was transferred to the presidency of the board of Trade. In 1914 he became a peer; was governor-general of South Africa, 1914-20; and was created an earl, 1920. He died Oct. 15, 1934, leaving no heir.

Buxton, SIR THOMAS FOWELL (1786-1845). British philanthropist. Born April 1, 1786, he



Sir Thomas Buxton,
British philanthropist
by H. P. Briggs, R.A.
After a painting

was educated privately and at Trinity College, Dublin. In 1808 he entered a firm of brewers, of which he became a partner. His earliest social work was in the relief of the Spitalfields weavers, 1816, and in the reform of prison conditions. During 1818-37 he was M.P. for Weymouth. A zealous advocate of the abolition of slavery, in 1824 he succeeded Wilberforce as head of the anti-slavery party, whose efforts resulted in the total abolition of slavery in British possessions, 1834. In 1840 he received a baronetcy. He died Feb. 19, 1845. Consult Buxton the Liberator, R. H. Mottram, 1946.

Buying-in. Stock Exchange term for an operation carried out when a seller of stocks or shares fails to deliver the scrip on the day appointed for settling. In such event the buyer can go into the market and purchase the stock at the current price, charging the defaulting seller with all the expenses incurred. On the London Stock Exchange ten days' grace is allowed before the buyer can buy in.

Buys-Ballot's Law. Statement in meteorology relating the pressure gradient to the direction

of the wind. An observer standing with his back to the wind will have lower pressure on his left hand and higher pressure on his right hand while in the northern hemisphere; in the southern hemisphere the converse holds. This statement is called Buys-Ballot's Law after the Dutch meteorologist Christoph Buys-Ballot (1817-90).

Buzau. City of Rumania, in the Ploesti region. On the Buzau river, 60 m. N.E. of Bukarest, it is a rly. junction, a mart for timber, grain, hides, and petroleum, and has metal works, flour mills, and distilleries. Pop. (1948) 43,365.

Buzoe's Grave. Spot in the Gibson Desert, western N.S.W., marked on all official maps of Australia. In 1876 a survey party was mapping the area and had with them a cow called Buzoe which served as their mobile dairy. On Buzoe's death from old age, the surveyors buried the animal near by and marked the grave on the charts they were compiling.

Buzuluk. A town of Chkalov region, in the R.S.F.S.R. It is on the Samara river, 140 m. N.E. of Chkalov, with which it is connected by rly. An agricultural centre, it makes agricultural implements, flour, and alcohol, and treats sheepskins.

Buzzard (*Buteo*). Genus of birds of prey coming between the eagles and the hawks. There are about twenty species, ranging over a great part of the world, but



Buzzard. The European buzzard alighting at the nest with its prey

unknown in Australasia and the Oceanic islands. The European buzzard is usually found in wooded districts, where it nests on the forked branches of trees; in mountainous country it selects ledges or crevices in the rocks. It feeds upon rabbits, birds, and reptiles. The male is about 21 ins. long, the female 23 ins.

Buzzard's Bay. Inlet of the Atlantic on the S. coast of Massachusetts, U.S.A. Elizabeth Islands

lie across the S. opening, and it extends N. to the base of Cape Cod peninsula, being connected by canal with Cape Cod Bay. Well sheltered from the ocean, it is a popular resort, and has a number of harbours, including Wareham and New Bedford. It is 30 m. long and from 6 m. to 10 m. broad.

By, JOHN (1781-1836). British soldier and engineer. Born and educated in England, he joined the Royal Engineers in 1799 and served in Canada 1802-10. He returned to serve in the Peninsular War, 1811, and during 1812-21 was in charge of government powder mills in England. In 1826 he was again sent to Canada to construct the Rideau canal (completed 1832) between the St. Lawrence and the Great Lakes. The settlement in which By and many of his workers lived, called Bytown, was in 1854 renamed Ottawa, and in 1858 became the capital of Canada. By died Feb. 1, 1836.

Byblos. Classical name of the ancient Gebal, mod. Jubeil, Lebanese port 25 m. N. of Beirut on the Adonis r. Gebal was one of the oldest of the Phoenician city states. Hither came Egyptian ships from at least 2800 B.C. to trade for timber and resin from the conifer forests of Lebanon; temples were built to the local goddess in Egyptian style and Pharaohs sent royal gifts. In the Middle and New Kingdoms, the Egyptianised princes of Gebal were loyal vassals of Egypt. In the 14th and 13th centuries the city became the centre of a scribal school from whose experiments the alphabet may have developed. Soon after 1200 B.C. Gebal fell before the Sea Peoples, but it recovered, and when the Egyptian Wen Amun came thither to bargain for wood in the 11th century he was treated with scant respect. But the deforestation of the hinterland and the rise of Tyre and Sidon caused Gebal to decline in importance; Ezekiel mentions the place as a city of sailors and shipwrights.

In classical times Byblos was a port of export for papyrus from Egypt—hence *biblion*, a book, and the English word Bible. Byblos was the traditional birthplace of Adonis, and the Adonis-Astarte temple here attracted pilgrims. It was known to the Crusaders, who captured it in A.D. 1109, as Giblest; their castle still stands.

The French excavators of ancient Byblos have discovered temples and tombs and a royal necropolis of the Middle Kingdom

with rich grave furniture. Later royal graves include that of Ahiram (contemporary with Rameses II) whose sarcophagus bears an early Phoenician inscription.

Bydgoszcz (Ger. Bromberg). Town of Poland, capital of a region of the same name. A rly. junction, airport, and military h.q., it stands on the Brda (Brahe), near its union with the Vistula, 25 m. W.N.W. of Torun (Thorn). It owes its importance to its position at the E. end of the canal which links the Brda with the Notec (Netze), and thus the Vistula with the Oder; this was built 1774 by Frederick the Great in order to divert to the Oder the transport trade of the Vistula with its outlet at the free port of Danzig. A commercial centre of some importance from the mid-14th to the late 16th century, the town had declined to a village when it passed to Prussia in 1772. It became Polish again in 1919. It manufactures iron goods, locomotives, vehicles, machinery, furniture, paper, and flour. Pop. (1946) 134,614 (est. 1955, 200,000).

The region of Bydgoszcz, area 8,106 sq. m., pop. 1,457,653, is low-lying, with many woods and small lakes. Its agricultural products include rye, oats, rape, flax, potatoes, sugar beet, and livestock; its chief industries are the making of metal, wood, and leather goods and textiles, food processing, and sugar refining. Towns besides the capital include Torun, Wloclawek, Grudziadz (Graudenz), and Inowroclaw.

Byelorussia (Russian *byelo*, white). Form sometimes used for White Russia (*q.v.*).

Byland Abbey. A Cistercian abbey in the vale of York, England, 7 m. E.S.E. of Thirsk. Its first members came from Furness

Abbey, then belonging to the order of Savigny, and had attempted to settle in three other places before Roger de Mowbray gave them the Byland site. In 1147 they began to drain it; in the same year the order of Savigny was absorbed into the Cistercian order. In 1177 the monks moved to their new buildings, of which the fine ruins were given to the nation in 1920 by Lady Julia Wombwell.

By-laws. Term used in law to denote rules and regulations made by a body acting under some Act of Parliament, royal charter, or ancient custom. Thus, a municipal corporation has the power to make by-laws dealing with the good government of towns, a university for the governance of its members, a trade guild for the regulation of the trade. The first acts under Act of Parliament, the second under charter, the last under custom. A by-law which is contrary to the general law of the land, or which is unreasonable, is *ultra vires* and void.

Bylini. Russian popular ballads recounting deeds of legendary and historical heroes. Handed down orally, they can be divided into cycles associated with different districts or heroes, e.g. the cycle of Novgorod, the cycle of Peter the Great. Large collections of *bylini* were made during the 19th century.

Byng OF VIMY, JULIAN HEDWORTH (GEORGE BYNG, VISCOUNT (1862-1935). British soldier. He was born Sept. 11, 1862, youngest son of the 2nd earl of Strafford, was educated at Eton, and was gazetted to the 10th Hussars in 1883. He saw service in the Sudan, and went through the S. African War, where he raised and commanded the S. African Light Horse. He was commandant of the cavalry school at Netheravon 1904-05, and in 1912 went as commander-in-chief to Egypt.

In the First Great War Byng took the 3rd cavalry division to Belgium in Oct., 1914, and in May, 1915, succeeded Allenby as head of the cavalry corps. He left that to command the 9th corps in Gallipoli, and on the evacuation returned to France. In May, 1916, he took over the

Canadian corps, which he led in some of the most desperate fighting on the Somme, notably that for Vimy Ridge. Made a full general after his masterly but unlucky offensive at Cambrai, Nov., 1917, he was prominent in defeating the German offensive of 1918.

Appointed K.C.M.G. in 1915, he was raised to the peerage in 1919 as Baron Byng of Vimy, and received a grant of £30,000. He retired from the army, and during 1921-26 was governor-general of Canada. In 1928 he was created a viscount. He was commissioner of the Metropolitan Police, 1928-31, and a field-marshal from 1932. He died without an heir, June 6, 1935.

Byng, JOHN (1704-57). British admiral executed for neglect of his duty. Son of Admiral

George Byng, 1st Viscount Torrington (1663-1733), he entered the navy in 1718, and in 1727 received his first command. In 1745 he was made a rear-admiral, in 1747 vice-

admiral, and later in the same year commander-in-chief in the Mediterranean. He was M.P. for Rochester, 1751-57. In 1756 he was promoted to be admiral and sent in command of a small squadron to defend Minorca.

Hearing that the French had landed there on May 20, Byng bore down upon the French squadron off Port Mahon. The French stood on the defensive, and Byng, mishandling his ships, gave up the attack, decided it was impossible to save Minorca, and returned to Gibraltar. When the news of his defeat reached England Hawke was dispatched to supersede him and send him home under arrest. Byng was tried by court martial at Portsmouth, the trial lasting from Dec. 28, 1756, until Jan. 27, 1757, and was found guilty of neglect of duty in not doing his utmost either to relieve St. Philip's Castle, Minorca, or to engage and destroy the enemy's ships, but was acquitted of cowardice or disaffection. Sentence of death was passed because the articles of war allowed no alternative penalty. George II refused to act upon the court's recommendation to mercy, and Byng was shot on the quarter-deck of the Monarque in Portsmouth Harbour, March 14, 1757. He was buried at Southill, Beds.



John Byng,
British admiral



Viscount Byng,
British soldier



Byland Abbey, Yorks. Ruins of
the Cistercian house opened 1177

Byrd, RICHARD EVELYN (1888-1957). American explorer. Byrd



Admiral Byrd,
American explorer

was born at Winchester, Virginia, Oct. 25, 1888, and educated at the University of Virginia and the U.S. naval academy. Entering the navy, 1912, he commanded the naval unit of the Macmillan expedition to Greenland in 1925, and with Floyd Bennett, was the first to fly over the North Pole, 1926. Byrd led an expedition to the Antarctic in 1928, flying over the South Pole in 1929. Promoted rear-admiral in 1930, he led the second Byrd Antarctic expedition, 1933-35, accomplishing pioneer work in the Ross Sea. In 1939 Byrd was given command of the U.S. Antarctic service, an expedition sponsored by the U.S. government, and after his return in 1940 he served with the navy in the Pacific. In command of 13 ships, 17 aircraft, and 4,000 men, he led a new Antarctic expedition, Dec., 1946-March, 1947, which mapped over 800,000 sq. m. from the air, much of it previously unknown. He paid his last visit to the Antarctic in 1956, when he flew over the South Pole for the third time. His published works included *Little America*, 1930; *Discovery*, 1935. He died at Boston March 11, 1957.

Byrd, WILLIAM (c. 1542-1623). English composer. The details of his life are scanty. He may have been the son of a gentleman of the Chapel Royal or a native of Lincoln, and was perhaps a chorister at S. Paul's cathedral. In 1563 he became organist at Lincoln and in 1570 a gentleman of the Chapel Royal. "Bred up to musick under Thomas Tallis," to quote Anthony à Wood, Byrd worked closely with his master, and in 1575 the queen granted them a patent to print and sell all music and music-paper. Byrd's appointments led to lawsuits, as did his possession from 1593 of Standon Place, Essex, where he probably died, July 4, 1623.

One of the greatest English composers, with a vast output, Byrd wrote masses, madrigals, motets, anthems, and pieces for the virginals. The richness of his harmonic style has been compared favourably with that of Palestrina or Lassus. His understanding of the human voice is summed up

in a statement which ends with the well-known couplet:

Since singing is so good a thing,
I wish all men would learn to sing.
Consult Lives by Sir W. H. Hadow, 1923; F. Howes, 1928.

Byrne, BRIAN OSWALD DONN (1889-1928). Irish novelist, who wrote as Donn Byrne. He was born in New York, Nov. 20, 1889, and educated privately, at Dublin and Leipzig. He wrote many successful novels and short stories, including *Without Women*, *The Foolish Matrons*, *Messer Marco Polo*, *Blind Raftery*, *Hangman's House*, and *Brother Saul*. Byrne was killed in a motoring accident, June 18, 1928.

Byrne, EDWARD J. (1872-1940). Irish ecclesiastic. Byrne was born in Dublin and educated at Belvedere college there and the Irish college at Rome. Ordained in 1895, he held the post of vice-rector of the Irish college in Rome, 1901, returning to Dublin 1904. Appointed bishop auxiliary to the archbishop of Dublin in 1920, he became archbishop and primate of Ireland in the following year. He died Feb. 9, 1940.

Byrnes, JAMES FRANCIS (b. 1879). U.S. jurist and statesman. Byrnes was born at Charleston, South



James F. Byrnes,
U.S. statesman

Carolina, May 2, 1879, and left school at 14 to work for a firm of solicitors. In 1910 he was elected to the house of representatives, serving until 1925, and in 1930 entered the senate. Appointed associate justice of the Supreme Court in 1941, Byrnes became director of the office of Economic Stabilisation in 1942, moving to a similar position at the office of War Mobilisation in the following year. He attended the Yalta Conference with President Roosevelt, Feb., 1945; and in July, 1945, was appointed secretary of state by President Truman, whom he accompanied to the Three-Power Conference at Potsdam. In Dec. he attended a conference of the foreign ministers of Great Britain, Russia, and the U.S.A. at Moscow. He was the leader of the U.S. delegation at the first and second meetings of the United Nations in London and New York respectively, and attended both the council of foreign ministers in Paris, with Bevin, Molotov, and Bidault ("the big four"), and the subsequent

Paris peace conference, all in 1946. He resigned in Jan., 1947, and in 1950 was elected governor of South Carolina.

Byrom, JOHN (1692-1763). English poet and inventor of a system of shorthand. Born at Broughton, near Manchester, Feb. 29, 1692 (N.S.), he was educated at Merchant Taylors' School and Trinity College, Cambridge. In 1718 he established himself in London as a teacher of his system of shorthand. He became a fellow of the Royal Society in 1724. Author of the famous Christmas hymn, *Christians Awake* (written for his granddaughter,) he wrote poems, edited by A. W. Ward, 1894-1912. He died Sept. 26, 1763.

Byron, GEORGE GORDON NOEL BYRON, 6TH BARON (1788-1824). British poet, romantic innovator and himself a figure of romance. Born in Holles Street, London, Jan. 22, 1788, son of "Mad Jack" Byron, a Guards officer, and his second wife, the Scottish heiress, Catherine Gordon of Gight, he had a deformity of one foot. His father died when the boy was three, and his infant years were spent at Aberdeen in poverty. In 1794 George unexpectedly became heir to the barony of Byron, and succeeded in 1798. Mother and son moved to the half-ruined family estate, Newstead, Nottingham; and after preliminary schooling in that town and at Dulwich, Byron went to Harrow in 1801 and to Trinity College, Cambridge, in 1805. He had already, in 1804, fallen violently in love with his fourth cousin, Mary Anne Chaworth (1786-1832); his affection for her found expression in *The Dream* and *To a Lady* (in *Hours of Idleness*). At college he read only sporadically, devoting himself more to swimming (at which he excelled), riding, shooting, boxing, and cards.

While still at Cambridge Byron published in 1806 *Poems on Various Occasions*, a volume of juvenile verse; and in 1807 *Hours of Idleness*, heartily "slated" in the *Edinburgh Review*, to which Byron replied with a well-turned, biting satire in the heroic couplet and style of Pope (whom he greatly admired), called *English Bards and Scotch Reviewers*, 1809. It sold well, but Byron, recognizing its unfairness, withdrew it in 1811.

During 1809-11 he travelled abroad. His mother died in 1811, leaving him little but debts. In 1812, the publication of the first two cantos of his poem *Childe Harold's Pilgrimage*, written in

the Spenserian stanza, made him famous overnight. It brought a new and exotic world into English poetry; and made the poet a social "lion." The *Giaour*, 1813, The *Corsair*, 1814, *Lara*, 1814, *Parisina*, 1816, reinforced his renown.

A man of striking good looks and great charm, sensitive and romantic, patrician in outlook but possessed of a sincere and burning belief in liberal principles.

Byron, after violent love affairs with Lady Caroline Lamb and later with Jane, Lady Oxford, married Anne Isabella Milbank in Jan., 1815. She gave birth to a daughter, Ada, the following Dec. A month later she left him, and refused to see him again; the rights and wrongs of their quarrel remain unresolved. In April, 1816, Byron, now socially ostracised, left England for good. He lived at Venice, Pisa, and elsewhere in Italy, dividing his time between dissipation, outdoor pursuits—and hard work: *e.g.* in two-and-a-half years at Venice, 1816–19, he published the play *Manfred*, 1817, canto 4 of *Childe Harold*, 1818, *Beppo*, 1818, two cantos of *Don Juan*, 1819, and much else. *Don Juan* (*q.v.*) remains his surest title to fame. Women pursued and besieged him. By one of them, Clara Mary Jane (or Claire, as she called herself) Clairmont, Mary Godwin's step-sister, he had a daughter, Allegra, who, to his great grief, died in 1822, aged five. "The last attachment" (as Iris Origo called it) was to Teresa, Countess Guiccioli, who had been married at 16 to an Italian nobleman over 40 years her senior.

In 1823 Byron threw in his lot with the Greek rebels against the Turks. He arrived at Missolonghi in Dec. of that year, and died of a fever on April 19, 1824.

Byron just missed being a great lyricist—short pieces like "She walks in beauty" reached the verge. He wrote too quickly, and so committed errors of diction and taste. He was a superb letter-writer, in English and in Italian. He is enormously esteemed on the Continent of Europe, and there is



After Phillips

6th Lord Byron, British poet

a vast literature about him.

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Byron: the Years of Fame, P. Quennell, 1935; The Last Attachment, Iris Origo, 1949; Byron and Goethe, F. M. Butler, 1956; Lord Byron's Marriage, G. W. Knight, 1957.

Byron, HENRY JAMES (1834–84). British playwright. Born at Manchester, he entered the Middle Temple in 1858. His best play is *Cyril's Success*, 1868; his *Our Boys*, produced at The Vaudeville, Jan. 16, 1875, ran until April 18, 1879. He was the first editor of *Fun*. He died April 11, 1884.

Byron, JOHN (1723–86). British admiral whose misfortunes at sea earned him the nickname of Foul-Weather Jack. Born Nov. 8, 1723, the second son of the fourth Lord Byron, he sailed as a midshipman with Anson on his voyage round the world in 1740. Byron's vessel, the *Wager*, was lost, May 14, 1741, off the S. coast of Chile. The survivors, after terrible hardships, reached Valparaiso, and got to England in Feb., 1746. Byron was governor of Newfoundland, 1769–72, and in 1778 commanded a squadron sent to intercept a French fleet on its way to the N. American coast, which he eventually engaged in the indecisive action of Grenada, July 6, 1779. He became an admiral, and was grandfather of the poet. He died April 10, 1786.

Byron Bay. Port of New South Wales, Australia, 548 m. N. of Sydney, at the E. extremity of that continent. It is the outlet for a district that grows bananas, maize, potatoes, and vegetables; from the region it draws cream and milk for butter, pigs for bacon-curing. Pop. (1954) 1,996.

Byrsonima. Genus of ever-green shrubs and small trees of the

family Malpighiaceae, native to tropical America. They have opposite, undivided leaves, and yellow, white, or pink flowers in sprays at the ends of the branches. The bark, astringent in all species, is used in tanning leather. *B. crassifolia* (Guiana) in decoction is used in treating the bite of the rattlesnake; *B. spicata*, the Muruxi-bark of the Brazilian tanners, is used as a red dye.

Bytom. Polish form of Beuthen (*q.v.*), the German name of a town in Silesia.

Bywaters-Thompson Case. British murder trial in 1922. Frederick Bywaters, a sailor, who was the lover of Edith Thompson, stabbed and killed Percy Thompson, her husband, in her presence in a street at Ilford. Bywaters and Mrs. Thompson were charged with the murder and both were convicted and hanged. Bywaters was undoubtedly guilty, but controversy as to Mrs. Thompson's guilt has continued. She had written many letters of a very romantic nature to Bywaters when he was with his ship abroad, in some of which she recounted attempts of hers to poison her husband. By these letters, it was contended, she incited Bywaters to murder him. The defence claimed that these letters must not be read literally; they were merely the outpourings of Edith Thompson's romantic nature, and the accounts they contained of her attempts to poison her husband were sheer invention.

Byzantine Empire, THE. The eastern part of the Roman Empire. The process of dividing the Roman Empire administratively, consolidated when in 330 Constantine the Great founded the new imperial capital named after himself on the site of the ancient city of Byzantium on the Bosphorus, reached its final stage with the death of Theodosius I in 395; of his two sons, Honorius ruled from Milan during 395–423 over Italy, Africa, and the chiefly barbarian regions of western Europe, whilst at Constantinople Arcadius was emperor 395–408 of the older, more densely populated, and economically much wealthier lands of the East. The line of Honorius's successors was ended by the barbarian chieftain Odoacer who deposed Romulus Augustulus in 476; but the East Roman or Byzantine Empire was to survive through a great many crises and perils until Constantinople fell to the Ottoman Turks in 1453. Greek in language and culture, Christian

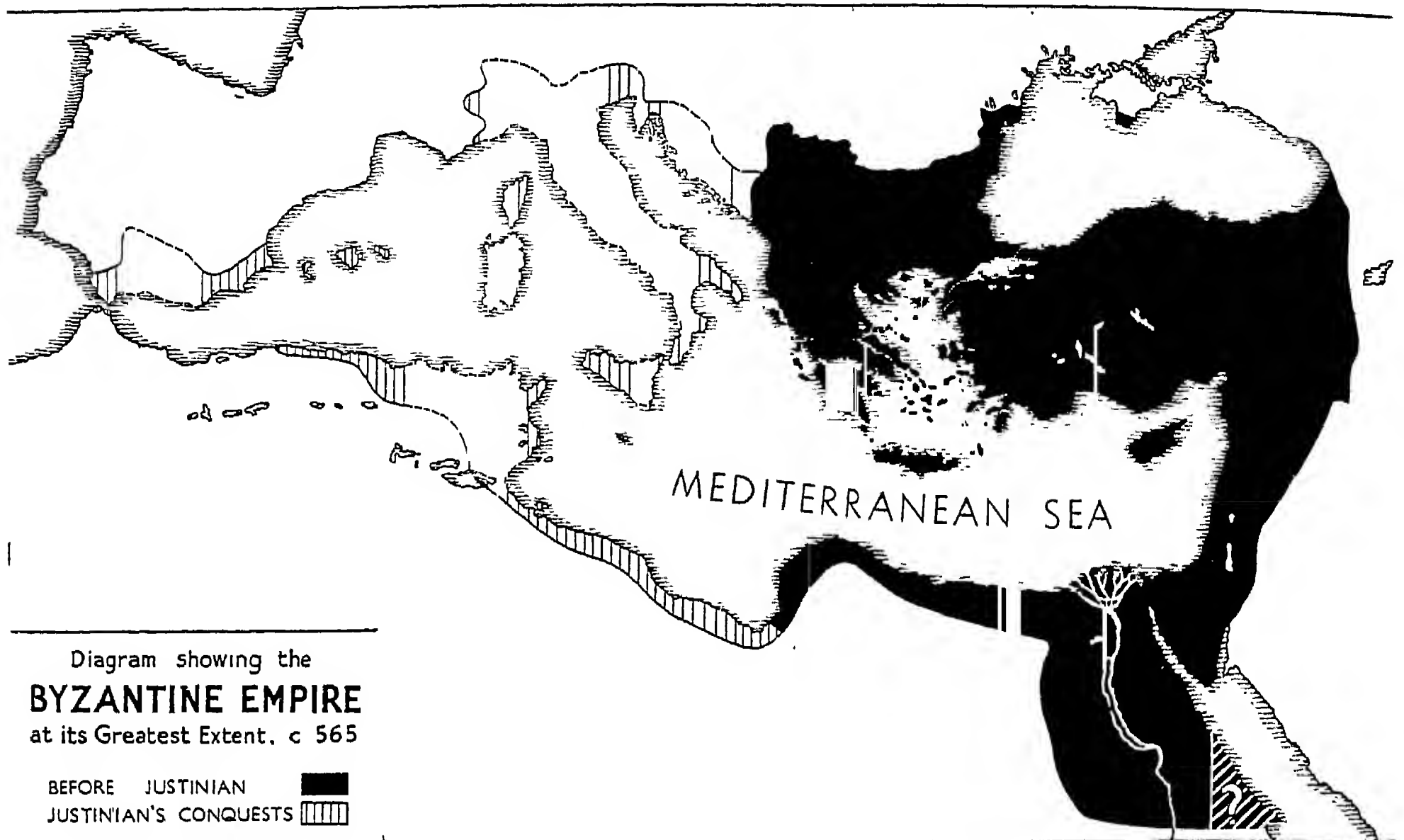


Diagram showing the
BYZANTINE EMPIRE
at its Greatest Extent, c 565

BEFORE JUSTINIAN
JUSTINIAN'S CONQUESTS

in religion, Byzantium was both in form and in theory the continuation of the Roman Empire and, despite its mixed racial composition and Oriental and other influences upon its government, religion, art, and ceremonial, it remained so to the end. Byzantine emperors, whether Macedonians, Anatolians, Syrians, or Armenians by birth, invariably referred to themselves and their subjects as "Romans" (*Ρωμαῖοι*), and the capital was commonly called New Rome.

This endurance through more than a millennium of attacks by external foes and recurrent internal crises is a striking tribute to the vigour and recuperative powers of Byzantine government and society, and to the skill and determination of the emperors, many of whom were rulers of the highest ability. More than to its military strength, which was numerically probably never very great, Byzantium owed its survival to diplomacy, whereby the wealth of the Empire and the prestige and attractions of its Roman and Christian inheritance were exploited to gain allies and to play off enemies against one another; to its fortunate economic position at the intersection of the principal trade routes between East and West, which made it for many centuries incomparably the richest state in Christendom; to the all but impregnable situation of its capital, the largest and most magnificent of medieval cities; and to its impressive administrative and

financial organization, Roman in origin but greatly altered in the course of time to meet the changing needs of an Empire whose frontiers were never stable for long. This centralised bureaucratic apparatus, which was such a contrast to the local feudal administrations common in the West, seems to have functioned in the main with remarkable efficiency until the 11th century when, with the end of the Macedonian dynasty, there set in a decline from which there was to be no lasting recovery.

Threat from the Huns

In the 5th century the successors of Arcadius were concerned with meeting the threat constituted by the westward migration of the Huns and successive groups of Germanic tribes; for the most part these were deflected on to the Western Empire, where there was more room for settlement. Of more consequence were the great theological controversies about the nature of Christ which divided the Church; the decision of the Council of Chalcedon in 451 anathematising the Monophysites (who believed in one nature instead of two, human and divine) alienated the majority of Christians in Egypt and Syria. This division remained unhealed (despite attempts by later emperors to work out a compromise formula of belief) and weakened resistance to the Muslim invaders two centuries later.

Zeno, ruled 474-491, and Anastasius I, ruled 491-518, sought to

conciliate the Monophysites, but this policy caused a schism with the pope. This was ended by Justin I, a Macedonian peasant by origin, who usurped the throne on the death of Anastasius; he was followed by his nephew Justinian, ruled 527-565, under whom the Empire reached its widest territorial expansion. His brilliant general Belisarius first defeated the Persians, the chief enemies on the Eastern frontier, and then, having overthrown the Vandal kingdom in N. Africa, began in 534 the conquest of Italy, later completed by his successor Narses. It was in Justinian's reign that the various sources of Roman Law were codified by the emperor's jurists into one comprehensive and authoritative *corpus*.

Justinian was also responsible for the building of the great church of Hagia Sophia (holy wisdom); but, like his predecessors, was unable to heal the ecclesiastical division between Catholics and Monophysites (2nd Council of Constantinople, 553). Soon after his death much of northern and central Italy was lost to the Lombards; at about the same time Greece and the Balkans began to be occupied by Slav tribes, and a more menacing foe, the Avars, first appeared on the Danubian frontier, whence they menaced the Adriatic coast. Heraclius, ruled 610-641, the founder of the next dynasty, enlisted the help of the Slavs against them. He also defeated the Persians after a series of campaigns, 622-627, and

recovered all the lands they had taken from the Empire; but the results of this great triumph were shortly nullified by the rapid and widespread conquests of the Arabs under the successors of the Prophet Mahomet, who had died in 632: in rapid succession Syria, Egypt, and North Africa were lost, the islands of Cyprus and Rhodes became Arab bases, and in the reign of Constantine IV, 668-685, the capital itself had to meet a series of attacks from the sea that were repulsed only after the greatest efforts. During the same reign Bulgar tribes crossed the Danube and set up a principedom which Constantine was forced to recognize in a treaty of 681. This grew into the first Bulgarian empire, and was for more than three centuries one of Byzantium's most dangerous enemies. As early as 705 the Bulgars besieged Constantinople.

To meet these great dangers, the government and administration of the Empire were radically reformed by the Heraclian emperors; in particular, the old division into provinces was replaced by a new one into military districts called *themes*, wherein all power was placed in the hands of a military governor (*strategos*) responsible only to the emperor. Under this official the rural population was organized into peasant communities holding land on condition of rendering military service whenever needed. At this period, too, Greek finally replaced Latin as the official language of the Empire.

The Isaurian Dynasty

In 717, after a long period of internal disorder and civil war the *strategos* of the Armenian theme seized power in the capital as Leo III, founding the Isaurian dynasty which lasted until 802. It was founded at a most critical moment, for a vast Arab force was again besieging the capital by land and sea; but, with a characteristically Byzantine combination of generalship and diplomacy (allying himself with the Bulgars against the more immediately dangerous foe), Leo succeeded in routing the Arabs. Later in his reign, by forbidding the veneration of images, he initiated the policy of iconoclasm which caused serious dissensions in Church and State and, by alienating the popes, hastened the loss of the remaining Byzantine possessions in N. Italy, 752. The icons were restored in 787; banned again in 815, brought back in 843.

During the 9th century the Empire suffered further losses in the

West, where the Arabs began the conquest of Sicily (though Basil I, reigned 867-886, the usurper who founded the Macedonian dynasty, did manage to assert imperial authority in S. Italy). In the East the Arabs were now less of a threat; but 812 saw the Bulgars once more at the gates of the capital after the emperor Nicephorus I, 802-11, had been defeated and killed in battle in Thrace. But the walls of Constantinople proved impregnable, and the Bulgars retired. They were converted to Christianity in 864, but did not cease to be a menace to the Empire. Basil I kept them at bay by payments; his son Leo VI, 886-912, unwisely provoked a new attack. This was led by the tsar Simcon, 893-927, a most able ruler whose aim was nothing less than to make himself emperor; but again adroit diplomacy and the strength of the capital saved the Empire.

The later part of the 10th century and the early years of the 11th saw the Empire at its apogee. The two usurpers Nicephorus II Phocas, 963-969, and John I Zimisces, 969-976, inaugurated a great new series of conquests. Crete and Cyprus were retaken and the Empire's naval supremacy thus re-asserted; the Arabs were driven out of their remaining strongholds in south-eastern Anatolia and the offensive was carried into northern Syria. The important strategic position of Antioch, Muslim for more than 300 years, was retaken in 969. John Zimisces refused to pay tribute to the Bulgars, who were completely defeated by the next emperor, Basil II. Their lands were occupied, and once more the imperial frontier was advanced to the Danube.

No ruler of comparable energy followed Basil II, and in the short reigns of his successors the internal and external position of Byzantium seriously deteriorated. The great financial resources left by Basil were squandered, leading for the first time to the devaluation of the currency; the central power could no longer protect the soldier-cultivators of the themes from being dominated by large semi-feudal landowners. A new and dangerous enemy arose to the East: the Seljuk Turks, whose conquest of E. Anatolia was followed by systematic settlement, thus breaking up the pattern of Byzantine society in that region. In the West another foe, potentially as dangerous, appeared in the Normans who gradually conquered all the remaining Byzantine possessions in S. Italy, and fixed their ambitions

on the conquest of Constantinople itself. Owing to past neglect of the fleet, the emperors had to rely more and more upon the Italian maritime republics, especially Venice, for naval defence; this help could be purchased only at the cost of commercial privileges and concessions which seriously weakened the Empire's economy.

The Comneni

Alexius I Comnenus seized the throne in 1081; to him and his successors (Comnenan dynasty, 1081-1185) fell the task of dealing with these problems. The situation was further complicated by the Crusades, in part a reaction to the Seljuk conquests, and the consequent setting up of Latin states near the south-eastern border of the Empire. The first three Comneni were able soldiers and diplomats; with the aid of Venice Alexius in 1083 repulsed the Normans who had crossed the Adriatic; repelled a new series of attacks by the Kuman and Petcheneg tribes on the northern frontier, and effected the passage of the first Crusade through imperial territory with the least possible damage to his own interests.

John II, 1118-43, recovered Cilicia and asserted Byzantine authority over what was now the Crusading principedom of Antioch; Manuel I, 1143-80, sought by the traditional combination of arms and diplomacy to regain Italy and to unite the kingdom of Hungary to the Empire. Successful at first in the East, he suffered a very serious defeat by the Turks at Myriokephalon, 1176, in central Anatolia. Another period of civil wars followed his death. Isaac II Angelus was deposed and blinded in 1195; his son appealed to the West, and it was partly as a consequence that in 1204, weakened by excessive dependence upon the Latins and without reliable allies, the Empire suffered the loss of its capital to an army of avowed crusaders, financed and transported by Venice.

A line of Latin emperors ruled precariously from Constantinople for 57 years, and the imperial possessions in Greece and the Aegean were either parcelled out as feudal principedoms by the conquerors or became autonomous Greek despotates. The succession of Byzantine emperors was continued at Nicaea by Theodore Lascaris and his successors, 1204-61, until the general Michael Palaeologus succeeded in retaking Constantinople with Genoese assistance and in founding a

dynasty which ruled the remaining Empire until its final collapse (Palaeologan dynasty, 1261-1453).

Although Byzantium thus survived the catastrophe of 1204 by two and a half centuries, it was with the first capture of Constantinople that its full and independent existence came to an end. Thereafter it could not hope to survive by its own vigour and resources, but only by depending upon other powers. By brilliant diplomacy Michael VIII staved off disaster which threatened from the Angevin kingdom of Naples, the successor of the Normans in Italy; but in the 14th century the Empire was confronted by the last of its great Eastern rivals, the Ottoman Turks. The lengthy civil war which followed the death in 1341 of Michael's great-grandson Andronicus III, coinciding with fierce dissensions over the religious movement called Hesychasm ("quietism"), weakened the enfeebled state still further; to the north the Serbian king Stephen Dusan, 1331-55, proclaimed himself "emperor of the Serbs and Romans" and annexed most of the remaining Byzantine lands in the Balkans. In 1354 the Turks took Gallipoli, in 1361 Adrianople, and the Empire was thus hemmed in on all sides. Only with the help of western allies could the inevitable end be averted, but the now complete religious severance of East and West, and Byzantine memories of 1204, made any lasting alliance impossible. Twice was the formal union of the Churches proclaimed, at the Council of Lyons in 1274 and at Florence in 1439; after both proclamations the emperor's action was repudiated by a majority of the Byzantine clergy and no significant results followed.

The advance of the Turks was held up for a period after their shattering defeat by the Mongols of Tamerlane at Angora in 1402; but Manuel II, 1391-1425, and John VIII, 1424-48, were unable, for all their efforts, to reap any permanent advantage from the breathing-space thus gained. The end came under Constantine XI, 1448-53, with the siege of the capital by Mohammed II. For six weeks the small force inside the city held out against greatly superior numbers; but the once impregnable walls were breached by the Turkish artillery and on May 29, 1453, Constantinople was taken by storm, the last emperor dying heroically in its defence.

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LITERATURE. The extensive Greek literature produced in the Byzantine Empire from the 4th to the 15th century has, as a whole, little interest for the general reader. It contains few works whose purely literary merit is very great; most Byzantine writers were officials writing to instruct and inform; and the literature they produced tends to be limited in scope and somewhat didactic. But it has great value to the student.

The writers of the Empire were directly influenced and often dominated by their classical fore-runners, with whom they felt a strong continuity transmitted and strengthened through the Hellenistic age, and the language and manner of whose masterpieces they often strove slavishly to copy. Not until the 12th century did a vernacular style begin to be used to any considerable extent.

Most classical forms of composition are represented except the drama; in addition there is a large body of ecclesiastical writings—sermons, homilies, apologetics, dogmatic expositions, hymns, and a great many lives of saints. The novel is represented by the 7th-century story of Barlaam and Ioasaph and a number of much later verse romances; the epic by George of Pisidia (7th century), who wrote of the campaigns of Heraclius; and the anonymous Digenes Akritas (probably 11th century), the masterpiece of Byzantine secular literature.

Prose Writings

Byzantine prose falls into two principal divisions, theological and historical. Outstanding theological writers include, in the 4th century the so-called Cappadocian fathers (S. Gregory of Nazianzen or the Theologian and the brothers S. Basil the Great and S. Gregory of Nyssa). These, with their contemporary S. John Chrysostom, wrote a great number of homilies, sermons, prayers, and devotional

works, and had an immense influence on later writers. None of their followers approaches them in importance; but S. John of Damascus (8th century), and S. Theodore of Studium (795-826), both strong opponents of iconoclasm, and the mystic S. Simeon the Young (11th century) may be singled out for mention.

Historians. Procopius (6th century) wrote as a contemporary of Justinian's conquests and his extensive building activities. The emperor Constantine VII Porphyrogenitus (reigned 912-959) produced, amongst other works, two books On the Ceremonies of the Byzantine Court, and the so-called On the Administration of the Empire, intended for the guidance of his son, which contain a great deal of precious information. In the early 12th century the princess Anna Comnena wrote a panegyric account of the reign of her father Alexius I (the Alexiad), which is certainly the most readable of Byzantine histories. Among many other names may be mentioned those of Leo Diaconus (late 10th century), who wrote of the campaigns of Nicephorus Phocas and John Zimisces; Michael Psellus, a scholar and philosopher of the 11th century; the civil servants Cinnamus and Nicetas, who described the middle and later Comnenan period; and George Phrantzes, an eye-witness of the fall of Constantinople in 1453. There were many other chroniclers who wrote long accounts of world history (often beginning with the creation and carried down to their own times) for a less sophisticated public; Malalas (6th century), Theophanes the Confessor (d. 817), and Zonaras, whose Epitome ends in the early 12th century, are three of the most important.

Poetry. Of hymn-writers, after the Cappadocians, may be mentioned Synesius the 5th-century bishop of Cyrene, and above all Romanos (6th century), a Syrian by birth who brought the Greek hymn to its highest development. Amongst epigrammatists Agathias and Paul the Silentiary (6th century), Theodore of Studium, John Geometres (10th century), and John Mauropus (11th century) are the best known; while Theodore Prodromus (a name which may have become attached to the work of two or more writers) wrote in the 12th century a great quantity of court poetry and occasional pieces.

The names of numerous letter-writers, orators, commentators on the scriptures and the classics, and

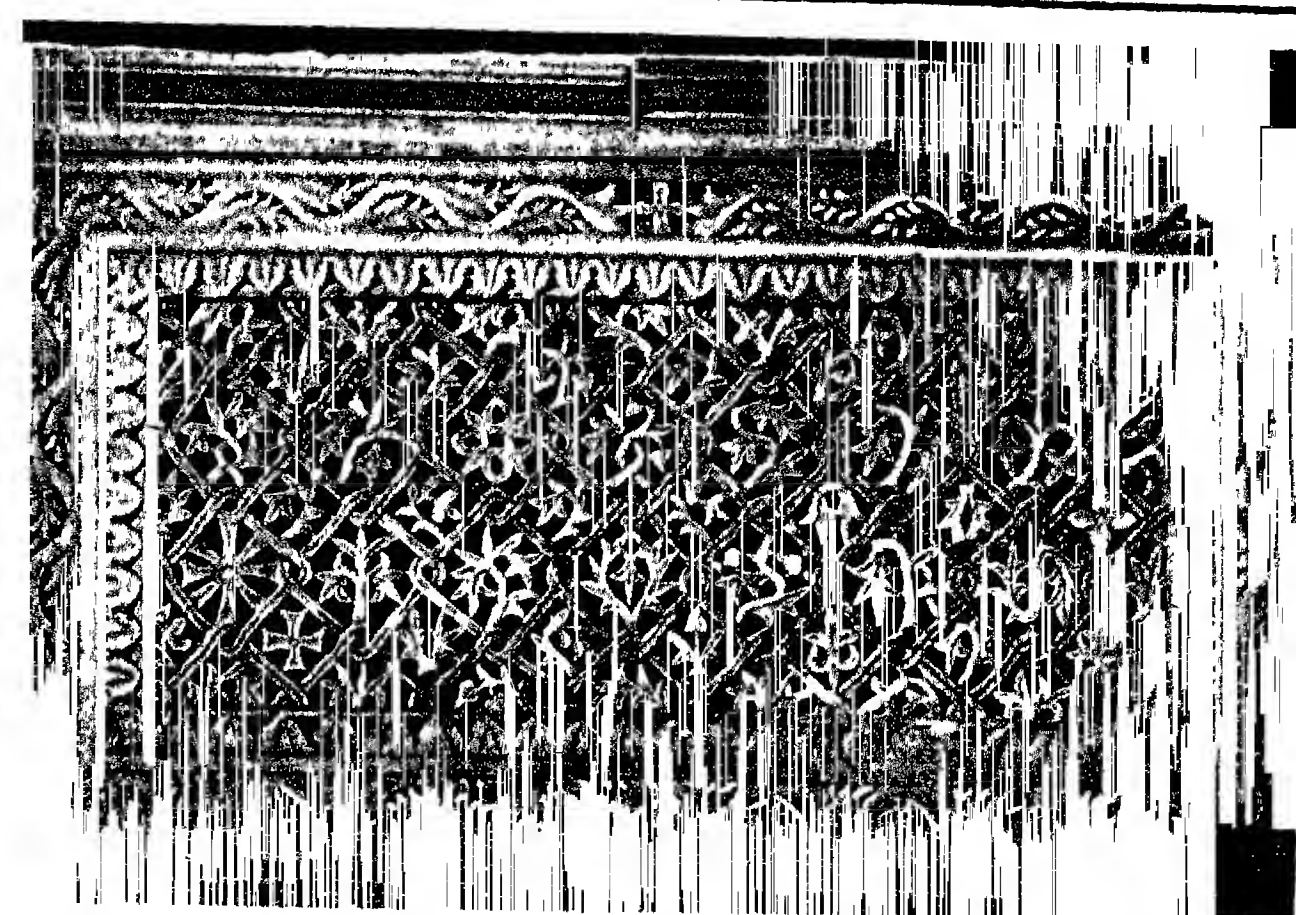
authors of administrative and military handbooks can be found in the works mentioned in the bibliography.

John Parker

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ART. Constantinople was the home of that efflorescence called Byzantine art, the leading motive of which was the adaptation of existing Greco-Roman and Oriental forms to the conception of Christianity held by Constantine and his fellow-converts.

During the reign of Justinian, 527-565, this art reached its zenith. The iconoclastic movement, initiated by Leo the Isaurian in the 8th century and directed against the exaggerated reverence shown to sculptured or pictorial representations of sacred things and persons, brought about a period of stagnation; and although in 787 the council of Nicaea revoked the harsh edicts against the "image-makers," it was not until the middle of the 9th century that the use of images



Byzantine Art. Example of stone filigree work from the Byzantine basilica of S. Vitale, at Ravenna, Italy; built A.D. 526-547

was restored. In 1204 Constantinople was taken by the Crusaders and sacked. Hundreds of monuments and smaller works of art perished, the most stringent ecclesiastical restrictions were imposed on art, which was virtually confined to the monasteries, and the Byzantine school had little further chance of recovery. Its greatest successes were in architecture; its least important developments were in sculpture, chiefly because this art, from its earlier association with the statues of pagan deities, was from the first regarded as idolatrous. Only small, purely ornamental sculptures executed in ivory, gold, and bronze exist.

Some fine examples of the first

period, dating from the 4th century to the iconoclastic controversy, have been preserved. The episcopal chair of Bishop Maximianus in S. Vitale at Ravenna illustrates the skill attained by the ivory workers and goldsmiths at that period; tablets, ecclesiastical registers, chalices, urns, and other objects also attest the vitality of Byzantine craftsmanship in this and succeeding periods. Byzantine bronze doors of the Renaissance are a feature not only of S. Sophia at Istanbul, but of several Byzantine churches in Italy, notably the cathedrals of Amalfi, 1066, and of Salerno, 1099, S. Salvatore at Arrani, 1087, and S. Paolo fuori le Mura, Rome, 1070. This metal work is often decorated with figure compositions, set out in silver, gold, and enamel work. The famous Pala d'Oro or retable at S. Mark's, Venice, consists of 83 figures or pictures in gold and enamel; single tablets, diptychs, and triptychs of kindred character are fairly plentiful in collections. The art of intaglio is beautifully illustrated by a triptych, in ivory, in the Louvre.

Illuminated Manuscripts

Byzantine painting may best be studied in the illuminated MSS., such as the sacred books, psalters, etc., preserved in the Bibliothèque Nationale at Paris, the Vatican at Rome, and other collections. Most of these are executed on linen. The characteristics of Byzantine painting are bright, rather crude colours and incorrect though expressive figure-drawing.

The guide to painting by the monk Denys of Fournas, discovered in the late 19th century, contains



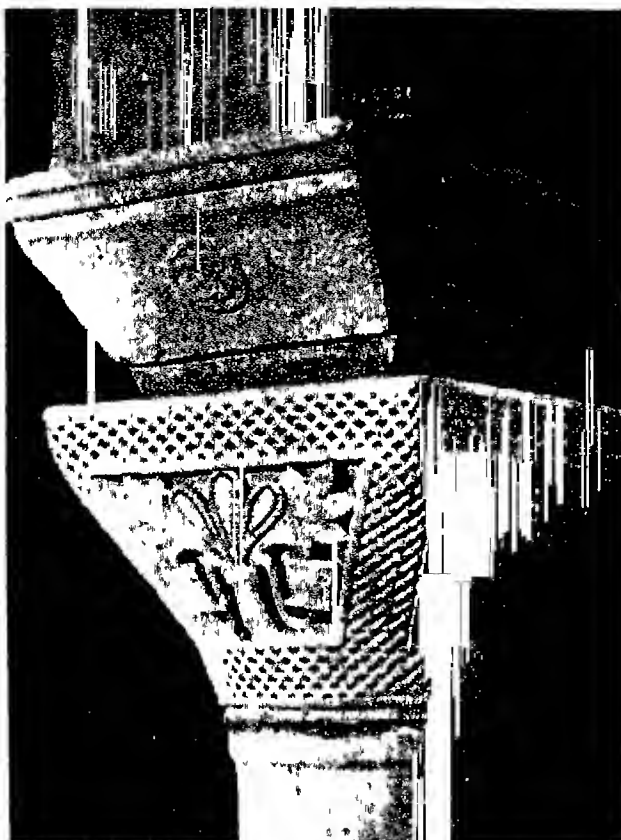
Byzantine Art. Fine example of carved ivory triptych dating from the 11th century and now in the Louvre, Paris

the strictest instructions to painters, not only as to their choice of subject and treatment, but as to the purely technical exercise of their craft. Mural painting in fresco was carried out chiefly in the humbler churches. Istanbul is virtually destitute of remains of these; but traces can still be seen in the chapels of the anchorite monks scattered through S. Italy and other districts where Byzantine influence prevailed. In the great churches mosaic was used instead of fresco. S. Sophia at Istanbul, S. Vitale, S. Apollinare Nuovo, and S. Apollinare in Classe Fuori at Ravenna furnish examples of mosaic executed before the Renaissance. The mosaics in the cupola of S. Mark's, Venice, date from the late 11th century.

Byzantine art exercised great influence both on the schools of Christian art that followed it and on Muslim art. In Russia particularly this influence appears in the 11th century; and Byzantine traditions persist, in an attenuated form, in the ecclesiastical art of Russia and Armenia.

ARCHITECTURE. Byzantine architecture is the architectural style having its origin in Constantinople (or Byzantium) after the transfer of the capital of the Roman Empire to that city, A.D. 330. In its essence it was a blend of Roman and Oriental architecture. The Roman architects employed by the emperor in Constantinople were not long in introducing experiments in Oriental design, which were at first confined to sculptural ornamentation; later the dome, the peculiar product of Eastern constructive methods, captured the architects' fancy and in time became the leading element in the new style, while the principles of domical construction underwent far-reaching developments. These architects were the first to achieve the structural feat of placing a hemispherical dome over a square chamber, and, by introducing the cushion capital, were the pioneers in springing arches direct from columns without an intervening entablature.

After the Empire split, the Byzantine style steadily matured within the Eastern Empire, and during the 6th century was rapidly extended beyond its borders. From this extension the emperor Justinian was chiefly responsible. In 532 he began to build the famous church of S. Sophia, regarded as the climax of Byzantine art. The churches of SS. Sergius and Bacchus, Con-



Byzantine Art. Byzantine capital on a column in S. Vitale, Ravenna

stantinople (Istanbul), 527, and S. Sophia, Salonica, 560, are other examples.

The division of the Church into a western or Latin-Catholic Church and a Greek Church determined the planning of the Byzantine church to suit the Greek ritual. For this reason all the smaller Constantinople churches of this era are square in plan, with the interior fashioned in the form of a Greek cross, just as all are domed. Elsewhere locality and the dominating political influence of the time appear to have modified the pure Byzantine type. Ravenna, for example, was the capital of the Western Empire during c. 404-493, and of the Gothic kings until 539; while during 539-752 it was the seat of Byzantine viceroys. Its churches accordingly exhibit an interesting variety of style, tending now to the Romanesque, now to the Byzantine. The plan of S. Vitale, for example, closely resembles that of SS. Sergius and Bacchus at Istanbul; others, "basilican" type, show Roman influence.

With the two styles, Byzantine and Romanesque, evolving side by side for a thousand years it is almost impossible to draw a strict line of demarcation between them. But the difference between the Byzantine building up to the 7th century and the neo-Byzantine of later date may be generally indicated. The earlier churches are noticeable for their absence of exterior effect; they exhibit plain brick façades, with the dome showing outside. Much of the interior decoration—wall facings of coloured marble and mosaic—is of great beauty. The representation of the human figure was denied to

Byzantine sculptors, but they found scope for their talents in the decoration of the capitals of the columns and the frontal portions of altars. The plan of the Roman basilica was generally followed, but churches grouped round a central dome are not uncommon. In the 10th, 11th, and 12th centuries they are still constructed of brick, but the dome is often enclosed in a polygonal drum tower carried up and closed with a pyramidal roof. In Greece and Asia Minor this drum tower design persisted.

External decoration gradually crept in; Venetian Byzantine, for instance, is characterised by a double dentil order, the edges of a narrow marble fillet being bevelled off alternately right and left. Late Byzantine churches include S. Mark, Venice, 1042-71; S. Fosca, Torcello, 1108; several examples in Athens and others in Syria; also S. Front at Périgueux in France, 1120.

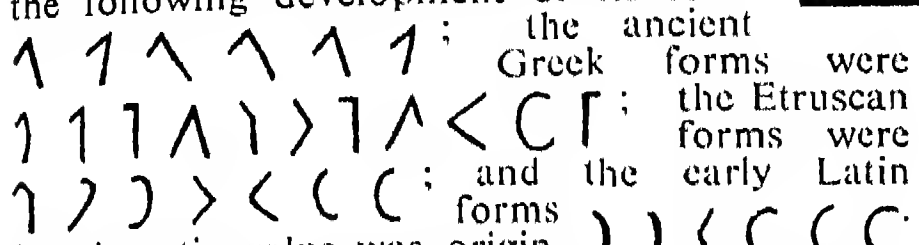

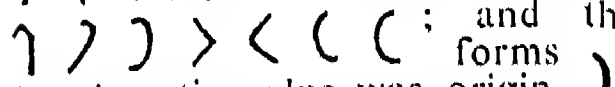
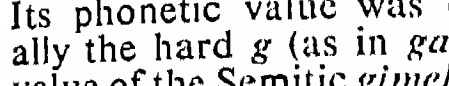
Of Byzantine domestic architecture virtually no traces remain.

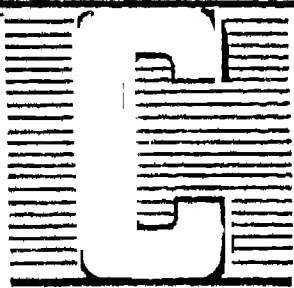
Bibliography. Manuel d'art byzantin, Ch. Diehl, 1910; Byzantine Art and Archaeology, O. M. Dalton, 1911; Byzantine and Romanesque Architecture, T. G. Jackson, 1913; L'Art Byzantin, C. Errard, 1927; The Byzantine Achievement, R. Byron, 1929; Byzantine Architecture, J. A. Hamilton, 1933.

Byzantium (Greek Byzantion). Doric colony founded about 660 B.C. by Megarian colonists under Byzas on the European shore at the mouth of the Thracian Bosphorus. Devastated by the Persians under Darius Hystaspes, it was raised by the Spartan leader Pausanias to the status of an important maritime and commercial city. For more than 100 years after the Persian War it was alternately hostile and friendly to Athens, until it obtained complete independence in 357. When Philip of Macedon threatened the liberties of Greece, Byzantium joined Athens and during a lengthy siege gallantly resisted the efforts of the Macedonians to capture it. Under Alexander and his successors it enjoyed a certain independence, but was obliged to pay tribute in 278 to the Celtic Gauls who had settled in Thrace.

During the 1st century A.D. Byzantium was included with Thrace in the Roman Empire. Constantine the Great, struck by its splendid position, enlarged and made it the new capital of the empire, A.D. 330, under the name of Constantinopolis (Constantinople), a city described under its Turkish name Istanbul.

C is the third letter of the present English alphabet and held the same position in the Semitic, Greek, Etruscan, and Latin alphabets, from which it derived. The earliest Semitic records reveal the following development of its form


 the ancient Greek forms were ; the Etruscan forms were ; and the early Latin forms . Its phonetic value was originally the hard g (as in *game*); this is the phonetic value of the Semitic *gimel* and of the Greek *gamma*. But the Etruscan knew no distinction between the



voiced stop (g) and unvoiced stop (k). The letter C retained the sound k in the Latin alphabet, though originally it served for both k and g; this early use is indicated by the stereotyped abbreviation of the proper names Gaius (C) and Gnaeus (CN). The letter G was an innovation

in the early 4th century B.C. The form C altered little in shape through the passing centuries. The minuscule character (c), being simply a smaller version of the capital, has also changed little.

As a numeral, the symbol C is identified in popular etymology with the initial of the Latin word centum (a hundred); in fact the Greek letter θ (*theta*), which represented the number 100, became ϵ . — in its turn, C.

C Third letter of the English and Latin alphabets.

In English it has two distinct sounds: a voiceless velar sound, that of k as in *cat*, *cut*, *cul*, and before e, i, y a sibilant or hissing sound, that of s as in *ensor*, *civil*, *cymbal*. The two corresponding voiced sounds are g and z. C is sometimes mute, as in *muscle*, *schism*, *victuals*, and when stand before k, as in *pack*, *trick*, has no influence on the pronunciation.

The combination *ch*, as in *church*, is a separate sign in some alphabets, e.g. Hindustani. In Greek derivatives *ch* is pronounced k, as in *character*, *echo*, *scheme*, and in words of French origin as sh, as in *champagne*, *charlatan*. In Scots words such as *loch* it is velar fricative, and has the sound of *ch* in German *doch*, *Nacht*. It is mute in *yacht*, pronounced yot.

The abbreviation C. or c. has a number of connotations many of which are listed under the heading Abbreviations.

C. In music, (1) the first note of the natural scale of C, the chief note of the Ionian mode.



This has been adopted as the normal or major scale, consisting of the level white keys of the pianoforte or organ; (2) the key of C was used throughout the classical period for certain transposing instruments of the orchestra, such as horns and trumpets. It became more usual to give key signatures to the parts.

Caatinga. Type of natural vegetation. It consists of tropical thornwood found in regions subjected to long droughts, e.g. on the tableland of N.E. Brazil, in Mexico, Central America, parts of the Sudan, E. Africa, and the hinterland of N. Australia. Caatinga forms a close jungle from 10 ft. to 15 ft. high, leafless for six or seven months each year, of which bare, brittle, lifeless-looking thorny bushes, relieved by umbrella-shaped acacias, are the characteristic plants.

Cáazapa. Town of south-central Paraguay. The capital of Cáazapa dept., it is 22 m. by rly. S. of Villa Rica. It is an agricultural centre. Pop. (est.) dept., 70,000; city, 20,000.

Cab. Colloquial abbreviation of the French *cabriolet*, a gig-like covered carriage on two wheels drawn by two horses. The term came to be applied to a licensed hackney vehicle seating two or four persons which could be hired on the street or from a rank for a specified journey.

Cabriolets were plying for hire in Paris in 1670, and in the 18th century hackney coaches were available in large numbers in London. But hackney coach fares were high, and it was not until 1820 that the cab, in the present-day sense of the term, appeared in London. These early cabs were licensed and were subject to regulations designed to protect passengers from excessive charges;

and as the cab fares were a third less than those for hackney coaches the number of cabs increased rapidly. The cabs, which had four wheels and were drawn by a single horse, were nicknamed growlers.

J. A. Hansom (1803–82), an architect, was the inventor of the two-wheeled cab called a hansom after him. Introduced in 1834, in its early form it had the driver seated at the side of the body. This was later altered to become the large, two-wheeled vehicle on which the driver was perched in a dickey seat placed high up at the back of the cab.

A three-wheeled cab was put on the streets in 1897, but proved unsuccessful. Towards the close of the 19th century cab wheels were fitted with solid rubber tires in place of steel tires.

The first motor-cab went into service in London in 1903. These vehicles were fitted with taximeters (*q.v.*) which automatically registered the charge due from the passenger. With the rapid development of the internal-combustion engine, the taxicab (commonly called simply a taxi) soon superseded the horse-drawn vehicle.

The word cab was first officially used in the London Cab Act of 1896. The first regulations for taxicabs in London were issued in 1907. Some 8,000 taxicabs ply for hire in London alone.

Cabal. Name given to a group of men working in secret for their own interests rather than for those of

the people they are supposed to represent. The word, derived from the Hebrew Cabbala or Kabbala, the secret philosophy of the Rabbins orally transmitted, came to mean any small clique of intriguers. It obtained general currency in England in the time of Charles II from the initial letters of the names of his five



Cab. 1. Four-wheeled cab or "growler," introduced into London in 1820. 2. Hansom cab, invented by J. A. Hansom in 1834

ministers, Clifford, Ashley, Buckingham, Arlington, and Lauderdale, who were the origin of the modern cabinet.

Caballero, FERNÁN. Pen-name of Cecilia Böhl de Faber (1796-1877), a Spanish novelist, distinguished for



Fernán Caballero,
Spanish novelist

for the freshness of her vision and her realistic style. The daughter of a German father and a Spanish mother, she was born at Morges, Switzerland, Dec. 24, 1796, spent her childhood in Germany, and c. 1814 went to Spain, and settled there. She was married threetimes. One of her best-known works *La Gaviota*, 1849 (Eng. trans. *The Seagull*, A. Bethell, 1867), contains rustic sketches of southern Spain. She made collections of Andalusian folk-tales and poems, published in 1859, and her short stories, *Cuadros de Costumbres populares Andaluces*, 1852 (Eng. trans. *National Pictures*, 1882), enjoyed a wide popularity. She died at Seville, April 7, 1877.

Cabanis, PIERRE JEAN GEORGES (1757-1808). French physiologist. From 1795 he was successively professor of hygiene and of legal medicine and the history of medicine at the Paris medical school. He was physician to Mirabeau, and wrote several treatises on physiological psychology.

Cabaret (French). Word meaning originally a booth or wooden shelter; then a small inn or wine shop; now usually, by extension, an entertainment of the kind performed at a restaurant or night club while refreshments are being served or as an interval to the public dancing. The essential cabaret turn differs subtly from a music-hall or revue act in that the artist is in intimate touch with the audience and has no help from staging; at its best it is a solo performance, whether singing, dancing, or story-telling.

Cabatuan. Town of Panay, Philippine Islands, in the prov. of Iloilo. It stands on the river Tigum, 14 m. N.W. of Iloilo. The neighbourhood produces maize, rice, sugar, tobacco, coffee, and cocoa. Pop. 17,000.

Cabbage (Latin *caput*, head). Hardy biennial vegetable of the large family Cruciferae and genus *Brassica*. The common cabbage (*B. oleracea*) is the species, of which numerous types and varieties have been raised.

To obtain a supply of cabbages all the year round it is necessary to make three chief sowings. The most important kind is the spring cabbage, ready for use from March until midsummer when fresh vegetables are least plentiful. It is raised by sowing out of doors about the middle of July in northern gardens and in the first week of Aug. in southern gardens. The seedlings are raised on a spare border by sowing seeds in shallow drills about 6 ins. apart. The flea beetle, which almost always attacks the seedlings, can be prevented from doing damage by the use of derris dust. By Sept. the plants will be large enough to set out where they are to remain: they need firm and moderately rich soil. The plot from which onions have been lifted provides an ideal site. Some of the best varieties of spring cabbage are Harbinger (small and early), April, Flower of Spring, Ellam's Early, Mein's No. 1. In northern gardens planting should be completed in Sept.: in southern districts it may be continued in Oct.

Cabbages for late summer and autumn are raised by sowing seeds in March, and others for winter by sowing in April and early May. Both are sown on a spare border, and in summer, as soon as some of the early vegetables have been cleared, they are set out where they are to grow. If the seedlings become overcrowded in the seed bed before a plot of ground is ready for them, they should be lifted and replanted temporarily at 6 ins. apart.

First-rate cabbages for late summer and autumn are Velocity, Greyhound, Emperor, Winnigstadt, Enfield Market. For winter two excellent sorts are January King and Christmas Drumhead. The Colewort, a small cabbage for autumn, is sown in April-May. Red cabbage for pickling is sown in Aug. and again early in April.

Cabbage Fly (*Anthomyia brassicae*). Insect of the two-winged order, somewhat resembling the common house fly, ashy grey in colour. The larvae feed chiefly on cabbage, and do great mischief by devouring the roots. They are best destroyed by the application of calomel dust.

Cabbage Moth (*Mamestra brassicae*). Common British moth. It has greyish brown wings rather

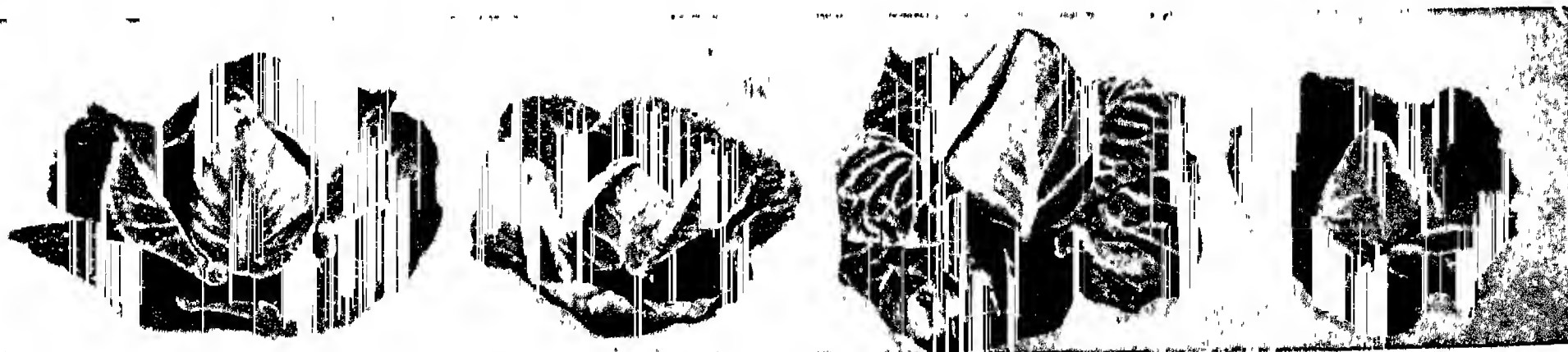


Cabbage moth, *Mamestra brassicae*

more than 1½ ins. in expanse, partly bordered and dotted with white. It flourishes in June-July. The caterpillar varies in colour, but is usually greenish brown with a dusky stripe down the back. It does great damage to cabbages and other plants by eating the leaves.

Cabbage-tree Bark (*Andra inermis*). Evergreen tree of the family Leguminosae. A native of the West Indies, it has leaves about a foot long, divided into five to ten pairs of oval leaflets with purple pea-like flowers. The bark is used as a remedy for intestinal worms; it has a disagreeable odour and a sweetish taste. Overdoses produce vomiting, delirium, and fever.

Cabbala (Heb. *kabal*, to receive). Hebrew mystical theosophy traditionally received by certain Jewish sects and not revealed explicitly in the O.T. The central doctrine is divine immanence, in a form akin to pantheism, and marked



Cabbage. Various types of this vegetable, which can be grown for use all the year round: L. to R., spring cabbage; summer cabbage; autumn cabbage; small spring cabbage

by the influence of neo-Platonism and Gnosticism.

Its written sources are *Sefer Jezirah*, or Book of Creation, and *Sefer Zohar*, or Book of Illumination. The former is ascribed to Rabbi Akiba, 2nd century A.D., and the latter to his pupil, Simeon ben-Jochai. Both works, however, on present evidence, are certainly not earlier than the 8th century.

Cabbalism flourished between the 12th and 16th centuries, and affected both orthodox Jews and Christians.

Cabell, JAMES BRANCH (b. 1879). American author. Born at Richmond, Virginia, April 14, 1879, he became a journalist and was engaged on the *New York Herald*, 1899-1901. He was later concerned in coal mining in West Virginia; and acquired a reputation for genealogical researches. With the publication and banning of *Jurgen* in 1919 he made his name as a caustically satirical novelist. His stories are set partly in the imaginary medieval country of Poictesme, which is peopled by the ancestors of the present-day characters. Among the best known are *The Cream of the Jest*, 1917; *The Silver Stallion*, 1926; *Special Delivery*, 1933; *The First Gentleman of America*, 1942.

Caber, TOSsing THE (Gaelic *cabar*, pole, beam). Field event at Highland games. The caber is the lower trunk of a fir tree, about 17 ft. long, 12 stone in weight, dia. 9 in. at the heavy end, 4 in. at the light. The pole is raised upright, with the light end resting upon the ground, by officials. The competitor supports it against his shoulder while working his fingers underneath, then lifts the pole upright on his hands until he has it balanced on them about waist high. He takes a run 10 to 20 yards and, with a tremendous impetus of all the muscles of the body, hurls

the pole forward into the air. In a perfect toss the caber should turn completely over in the air, come down upon its thick end, and fall prone with the thin end pointing away from the tosser in a straight line with his run.

Cabet, ÉTIENNE (1788-1856). A French Communist. Born at Dijon, Jan. 2, 1788, and trained



Etienne Cabet,
French Communist

for the law, he took part in the revolution of 1830 and was appointed procureur-general in Corsica. Elected to the chamber of deputies, and sentenced to imprisonment for revolutionary speeches, he fled to England and became converted to the communism of Robert Owen. Returning to

France, he published *Voyage en Icarie*, 1840.

In 1848 his followers established a communistic colony in Texas with Cabet as director. The site being unsuitable, they removed to Nauvoo, Illinois, where they prospered. Dissatisfaction with Cabet's rule led to his exclusion from the directorship in 1856. He retired with a minority of supporters to St. Louis, where he died Nov. 8, 1856. Consult *Ikaria*; a Chapter in the History of Communism, A. Shaw, 1884.

Cabinda OR KABINDA. Small Portuguese enclave on the W. coast of Africa, part of Angola. Lying N. of the mouth of the Congo, it is some 80 m. long by 20 broad, and has an area of about 3,000 sq. m. The capital, Cabinda, with a good harbour at the mouth of the Bele river, was formerly a slave-port. It exports palm-oil, ground-nuts, etc. Pop. 10,000.

THE CABINET: ITS GROWTH & POWERS

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The importance of the Cabinet in the constitution of the United Kingdom is here indicated. For further information see Commons, House of; Constitution; Parliament, etc.

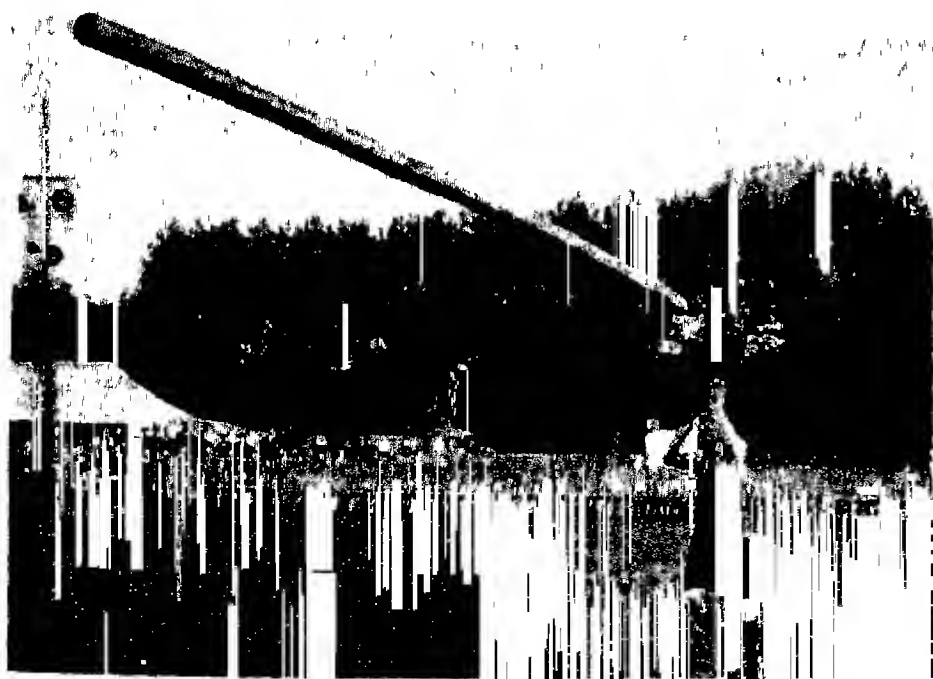
The cabinet is the pivot of the British constitution, and it owes its position to the fact that there is not in the British constitution any separation of powers between executive, legislature, and judiciary such as that which characterises the constitution of the U.S.A. The cabinet is not merely the supreme executive body; it is also part, an increasingly important part, of the legislature; and its control of, and responsibility to, parliament gives a greater unity to British government than is possessed by any other self-governing country.

Historically, the cabinet is descended from the privy council, and just as that council was an inner ring developed from the larger council of the Middle Ages, so the cabinet is an inner ring of the privy council; few members of the privy council are cabinet ministers but every cabinet minister is a privy councillor. The modern use of the word grew up in the 17th century and in practice the

cabinet became dissociated from the privy council in the first half of the 18th century.

The famous Cabal administration of Charles II's reign has been regarded as the earliest cabinet in English history. But it differed fundamentally from the modern institution. In the first place, it had no collective unity; its members, Clifford, Ashley, Buckingham, Arlington, and Lauderdale, whose initials gave it its name, were simply five individual ministers whom the king chose and consulted individually and of whose several recommendations he adopted as much or as little as he pleased; they were responsible to the king and not to parliament, and had little control over the legislature.

These modern characteristics of the cabinet were slow to develop, and it was not until after the Revolution of 1688 that William III discovered the advantage and the need of choosing ministers from the party which commanded a majority in the house of commons and could therefore guarantee adequate financial supply for carrying on the government. The Whig junto of 1697 was a nearer approach than the Cabal to a modern cabinet. Anne's reign began with a coalition government of Whigs and Tories, but by 1708 the resignation of the Tories left



Caber. Tossing the fir-pole or caber at the Highland meeting at Inverness

the ministry purely Whig. In 1710 it was supplanted by a Tory government, which remained in power until the death of Anne, in 1714, brought the Hanoverians to the throne, and with them a Whig supremacy which lasted until 1770. None of these experiments between 1660 and 1714 can be regarded as cabinets in the modern sense, however. The sovereign still framed policy, and consulted the chief ministers independently, when convenience dictated.

How the Cabinet Developed

Party government was thus secured, but there were still obstacles to cabinet government. There was a rooted distrust of the court, and parliament sought to protect its members from contamination by a series of place bills designed to maintain the separation of the legislature from the executive. Again, the privy council was the only recognized advisory body of the crown, but its members were numerous and included Tories as well as Whigs. It could not provide a sufficiently small or united executive, and there were no recognized means of distinguishing the members to form a cabinet from those to be excluded. Even today the cabinet minister takes no other oath than that which is taken by every privy councillor, and in the 18th century every privy councillor might claim to be consulted on matters of state.

Gradually, however, and chiefly during the long administration of Walpole, a monopoly was usurped by Walpole himself and a small group of ministers in whom he confided. It was he who developed the main features both of the cabinet and of the office of prime minister, with which the cabinet system is bound up. Both were disliked at the time by parliament and king alike, and the development was only made possible by the fact that George I understood no English and ceased to attend cabinet councils. In consequence, the prime minister presided at cabinet councils, and steadily asserted the right to select his colleagues; who, in consequence, were selected from his party, and became collectively responsible for their policy.

The essence of the system is that the cabinet tenders collective advice to the crown as a unit through the person of the prime minister. George III attempted to break up this unity and to consult ministers individually. The younger Pitt had great difficulty in stopping private communica-

tions on matters of policy between George III and his chancellors, Loughborough and Thurlow, who, as official keepers of the king's conscience, claimed exceptional privilege. In course of time Pitt's views prevailed, and the crown was reduced to the alternative of accepting or rejecting the advice of the cabinet as a whole. This was really no choice at all so long as ministers enjoyed the confidence of the house of commons, and the only circumstances in which it can now be said—and that very doubtfully—that the crown might reject the advice of the cabinet occur when the parliamentary majority on which the cabinet relies has ceased to represent the country. The result is that the advice of ministers has become the action of the crown. Whereas the crown used to govern by means of ministers, now ministers, united in the cabinet, govern by means of the crown's authority; the cabinet is the crown in commission. Hence also the disappearance of the royal veto on legislation, since it could be exercised only on the advice of the cabinet, and the cabinet necessarily enjoys the confidence of the legislature. The change has placed the sovereign above politics, although the sovereign's advice and experience are at the service of ministers, and may thus indirectly affect matters of state. Even where this occurs, however, the ultimate responsibility belongs to the cabinet.

Status of the Modern Cabinet

The younger Pitt's first cabinet contained only seven members. Owing to the increasing complexity of modern government the number tended to grow throughout the 19th century, until it reached the maximum of 23 in Asquith's coalition (1914-16). A violent reaction during the First Great War reduced it to five with a semi-detached member—an experiment repeated during the Second Great War. Two innovations introduced by Lloyd George were the creation of a secretariat and the publication of reports on the cabinet's work in 1917-18. Proper coordination between departments is possible only by regular and close consultation in cabinet councils, and a committee of five or six is too small in peace time for the adequate consideration of the complexities of domestic, imperial, and foreign policy. For the cabinet is supreme in all these matters, and although the interesting experiment was made during the First Great War of including

statesmen from oversea dominions who were not responsible to the British parliament, the achievement of full international status by the dominions made it impossible for the experiment to be repeated in the Second Great War.

Meanwhile, in the inter-war period, the cabinet returned to its normal peacetime size of 20-22 members, and during the same period several cabinet committees evolved, *e.g.* the committee of imperial defence and the committee on home affairs.

A most important feature of cabinet government is the control the cabinet exercises over domestic legislation. The house of commons can turn out a cabinet, but the cabinet can also dissolve the house of commons; and that threat, particularly when members are doubtful of re-election, is sufficient to determine the course of most legislation. The cabinet works best under a two-party system, where the opposition is ready to take office when the government loses the confidence of the majority of the electorate.

The self-governing dominions of the British empire have copied from the motherland the system of government by cabinet, which therefore prevails in Canada, Australia, South Africa, and New Zealand, as well as in most countries of Western Europe.

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Cabinet-making. Trade concerned with the finer and more delicate forms of furniture making, including cabinets and ornamental cupboards. It involves the use of hardwoods, put together with finer joints, made of slighter members than joinery work (*q.v.*), and ornamented with turned, carved, or moulded members. Workmen who wainscoted—*i.e.* lined with wood panelling—the walls of small rooms called cabinets, also made ornamented panelled cupboards which came in turn to be called cabinets. See Furniture; consult also Georgian Cabinet-Making, R. Edwards and M. Jourdain, 1944.

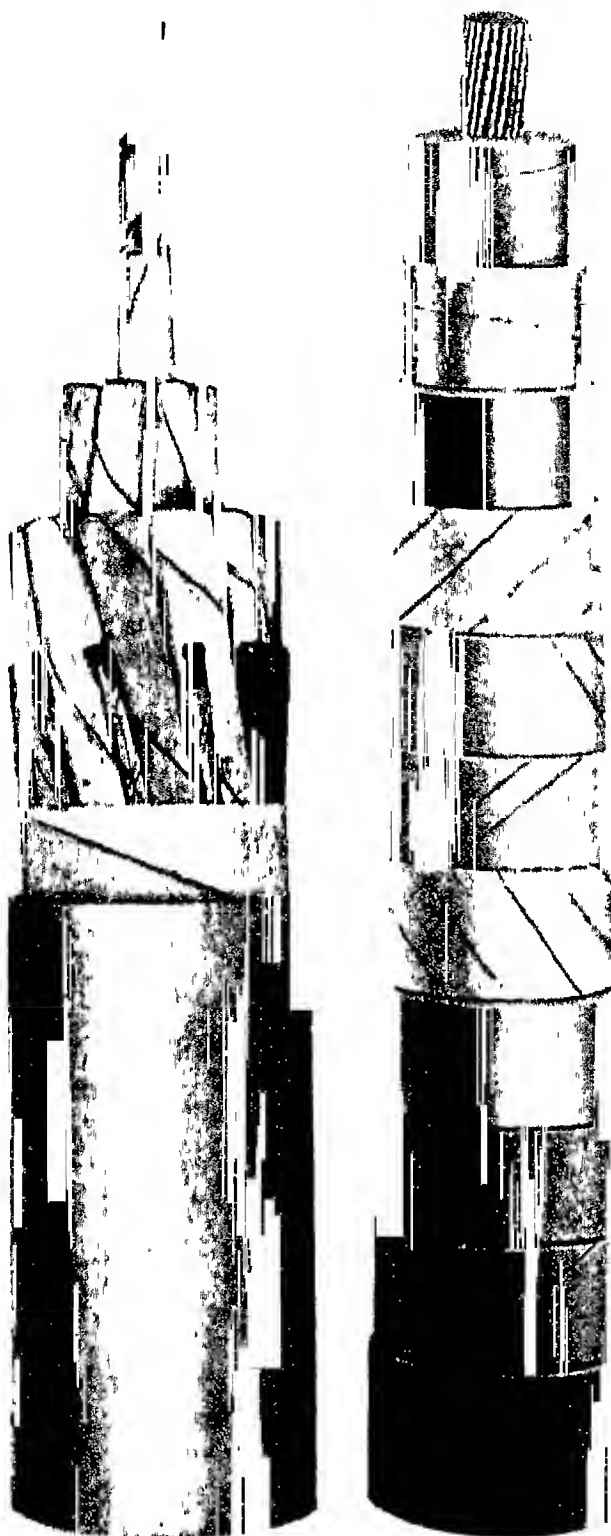
Cable. Nautical term for a rope, chain, or wire hawser attached to the anchor or used in any other way for mooring a ship. A cable's length is 100 fathoms or 200 yards. *See Chain.*

The word is also generally used in connexion with the transmission of electric currents. Electric cables consist of copper conductors covered with insulating material and external protection. The shape and size of the conductors, the thickness and type of the insulation, and the overall protection depend upon the purpose of the cable and the conditions under which it is to be used.

Cables may be grouped into two main classes: (1) those for conducting the weak intermittent currents in telegraphy and telephony; (2) those for transmission of electricity in bulk for power and lighting purposes.

TELEGRAPH CABLE. In submarine telegraph cables the conductor is usually composed of small wires laid up to form a flexible strand with a diameter ranging from about $\frac{1}{16}$ in. to about $\frac{1}{4}$ in., according to the length of the cable and the working speed demanded. Gutta-percha insulation has generally been used in the past, as it has excellent insulating properties under the great pressure and low temperature met with in the ocean depths. More recently a new thermoplastic material has been used. When mixed with suitable plasticising and other agents it is mechanically as good as gutta-percha, while its electrical properties are superior.

DEEP SEA CABLE. Two or more layers of the insulant are used to cover the conductor for deep sea cable cores. Each core, or group of cores, is protected against the teredo or boring worm by thin brass tapes wound on spirally.



Cable. Left, dry core lead-covered telegraph cable (76 strands of wire); right, single-core 132,000 volt gas cushion cable for underground transmission of electric power

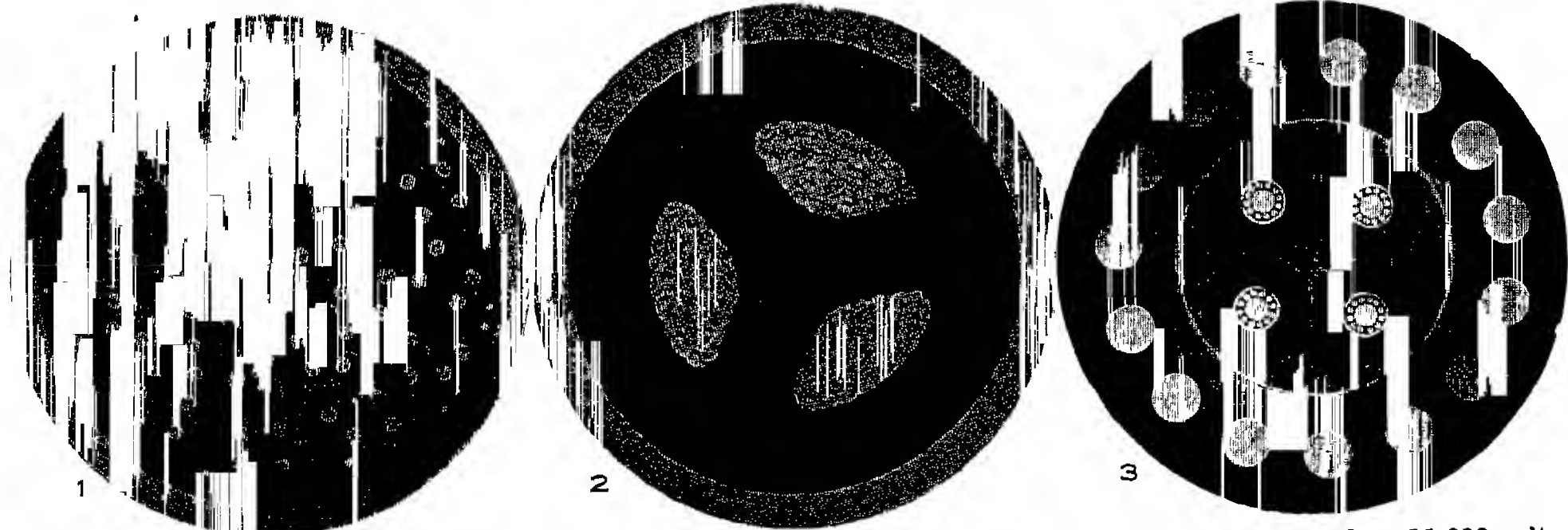
Henley's Telegraph Works Co., Ltd.

Alternatively, when high frequencies are to be transmitted, each core has a return conductor of thin copper tapes applied with a long lay, and these are bound overall with a thin copper protective ribbon. The cable is covered by two layers of jute bedding, over which is applied a layer of galvanised steel wires to give longitudinal strength, and

these are protected against corrosion by cotton taping and layers of hemp or canvas tape which are impregnated with hot bituminous compound.

The foregoing describes a normal deep sea cable, having a diameter of about 1 in. For shallow water cables and the shore ends of ocean cables the armouring wires are of greater thickness, to increase the weight of the cable, enable it better to resist the action of tidal currents, and protect it against damage by anchors, trawls, and rocks. Any one cable may contain sections of up to half a dozen different types, ranging from the deep sea cable through three or four intermediate types to the shore end. The longest cable yet laid in one length is the section of the all-British Pacific line from Vancouver to Fanning Island, 3,458 nautical miles.

TELEPHONE CABLE. Underground telegraph and telephone cables have conductors of single copper wires, weighing from $6\frac{1}{2}$ lb. to 400 lb. per mile, and up to 2,000 conductors may be included in one cable. The wires are insulated by special paper wrapped round them to form loose, air-filled tubes, since dry air is an excellent dielectric. Telephone conductors and their coverings are twisted together in pairs with long lay, and the pairs cabled together in layers, each layer in the opposite direction to the one below, to minimise induction. Telegraph conductors, which are in some cables associated with telephone circuits, and are arranged in rings outside them, have a special copper tape wound over the paper to form a continuous conducting tube, which is earthed to the lead sheathing to act as a screen and prevent interference between circuits. The lead or lead alloy sheathing is extruded on to the



Cable. Sectional diagrams of electric cables. 1. Dry core cable of 76 wires, shown above. 2. 3-core 3-phase 11,000-volt cable as used in underground railways. 3. 4-core gutta-percha insulated brass taped submarine telephone cable

By permission of Henley's Telegraph Works Co., Ltd.

laid-up cable by means of a hydraulic press. Where necessary, the cables are armoured by steel tapes or wire armouring, with compounded jute or hessian layers above and below to give protection against corrosion.

HIGH FREQUENCY CABLE. Modern requirements of high frequency transmission have been met by using thermoplastic insulation. For the highest frequencies, or where appreciable distances are involved, it is now usual to employ coaxial conductors. These are spaced apart by only a small amount of solid material, so arranged that most of the cable dielectric consists of dry air. The spacing may be effected by means of circular thermoplastic disks or washers placed along the inner conductor at intervals of a few inches; alternatively a thread of dielectric material may be wound around the inner conductor in a single long-lay helix. By these means an effective dielectric constant only 10 or 15 p.c. greater than that of air itself can be obtained. Such cables are used for the simultaneous transmission of several hundreds of telephone conversations over distances of 100 m. or more, if suitable intermediate repeaters are used. See Co-Axial.

POWER CABLE. The types of insulant used for power or lighting cables are: impregnated paper, rubber, varnished cambric, or vulcanised bitumen. Vulcanised rubber is used for house wiring cables, machine connexions, and flexible cables of all kinds from lighting flexes to heavy mining and quarry cables for coal-cutters, drills, and electric shovels. Rubber insulation is made by mixing the raw rubber with other ingredients in heated mills. The mix is calendered into thin sheets, cut into strips, and lapped on to the stranded conductors. Rubber-insulated cables are usually taped and braided, but may be armoured, except the tough rubber-sheathed type, which is specially made to withstand abrasion and flexing.

For transmission and distribution cables, which are normally laid underground, impregnated paper insulation is generally used. The conductors are wrapped with the required number of dry insulating papers, twisted together, and covered with more belt papers. The whole is next dried and impregnated with suitable insulating compound. Because impregnated paper is hygroscopic, such cables are invariably lead-sheathed. Cables laid direct in the ground

are normally protected over the lead sheath by compounded jute, or hessian tapes, and steel tape or wire armouring, the latter where longitudinal strength is required. Varnished cambric insulation, prepared by treating sheets of calico with linseed oil base or bituminous varnishes, is less hygroscopic than paper. Layers are lapped on to the stranded conductors to build up the required insulation thickness, as for paper insulated cables. Varnished cambric cables are most frequently made as single core cables, since they are useful for short power connexion. They may be taped, braided, and compounded over the insulation, or lead-covered.

Power cables may be supplied as single, twin, or multicore cables, depending on the system and voltage employed. Now that alternating current systems are almost universal, three-core cables are most general.

SUPERTENSION CABLE. Increased use of electricity has caused a progressive increase in the economic transmission voltages for electric power. The normal types of impregnated paper power cable are suitable up to about 22,000 volts. At 33,000 volts "screened" type cable, having each core surrounded by a thin metallic screen to eliminate tangential stresses in the dielectric, are most frequently used. Above this voltage, oil-filled cables, specially made to remain full of oil under all conditions of load, have been successfully developed. Alternative types of cable employing gas under pressures up to 250 lb. per sq. in. have also been put into service. Such cables have the gas-retaining lead sheath reinforced by several thin layers of suitable metal tapes, and are protected against corrosion. See also Atlantic Cable.

W. H. Lythgoe, M.I.E.E.

Caboched, CABOSHED, OR CABOSSED (Fr. *caboche*, head). Term used in heraldry. When the head of a man or beast is borne full faced, with no neck showing, it is said to be caboched. Mask or face is sometimes used if the head is that of a lion or leopard.

Cabot, JOHN (c. 1450-98). Anglo-Italian navigator and explorer. Born at Genoa, he moved to Venice in 1461 and was naturalised in 1476. About 10 years later he settled in England, and in 1496 King Henry VII, by letters patent, authorised him "to seek out, discover and find" all hitherto unknown lands. He sailed

from Bristol with his sons and a crew of 18 men on May 2, 1497, and 52 days later reached N. America at Cape Breton Island. Cabot, satisfied that he had arrived at the N.E. coast of Asia, which he was seeking, then returned, arriving at Bristol on Aug. 6.

As the discovery promised considerable wealth, Henry VII awarded him a pension of £20, and advanced money for a new voyage, granting fresh letters patent in Feb., 1498, for the possession of lands discovered. Three months later Cabot again sailed from Bristol, this time with a small fleet and 300 men. His plan now was to reach Greenland, then believed to be the extreme N.E. of Asia, by way of Iceland. One of his ships was driven back off the N. of Ireland by a storm, but Cabot pushed on with the remainder, and landed on the eastern shore of Greenland in June. He named the land Labrador after João Fernandes, a *lavrador* or farmer, from whom in Portugal he had first heard of it, and later the name was given to the present coast of Canada in the belief that it was part of Greenland. On June 11 the crews mutinied and refused to go further northwards, and Cabot was compelled to turn S. He rounded Cape Farewell, crossed Davis Strait, and touched Baffin Land, convinced that this was Asia. Then, sailing S.E., he passed Newfoundland and Nova Scotia, and finally reached Bristol in the autumn. He died soon afterwards.

It may be added that there has been in the past much confusion between John Cabot and his son Sebastian, who was credited by some biographers with several of his father's discoveries.

Cabot, SEBASTIAN (1474-?1557). Anglo-Venetian navigator. The son of John Cabot, he was most probably born at Venice, and came to England about 1493 with his father, with whom he sailed to Cape Breton Island in 1497. Nothing further is known

Sebastian Cabot, Anglo-Venetian navigator
From an old painting
of his life until 1512, when he was paid for making maps of Gascony and Guienne for Henry VIII. In the same year he entered the service of Ferdinand of Spain as a cartographer, and in 1519 was pilot major to Charles V. During 1526-30 he was in command of a



Spanish expedition to S. America and explored La Plata. The voyage being unprofitable, he was banished for four years on his return, but was reinstated in his former post in 1533.

He left Spain in 1547, and returned to England as adviser in marine affairs to the English government, and from 1551, as governor of the Merchant Adventurers, he rendered service to mercantile shipping. He organized the voyages of the company of the Merchant Adventurers to Russia in 1553, 1554, and 1556. The exact date and place of his death are not known.

Cabot Strait. Channel between Newfoundland and Cape Breton Island. Forming the entrance to the Gulf of St. Lawrence, it is about 60 m. wide. It is named after John Cabot.

Cabra. Town of Spain, in Córdoba province. It is 38 m. S.E. of Córdoba, on the rly. to Málaga. An historic city, and for long the seat of a bishopric, its former cathedral was at one time a mosque. Its ruined Moorish castle is of great interest. Cabra has jasper quarries, potteries, and a large trade in wine. Pop. (1950) 22,174.

Cabral, PEDRO ALVAREZ (c. 1460-1526). A Portuguese navigator. The son of Fernão Cabral, governor of Beira and Belmonte, in March, 1500, he was placed by King Emmanuel of Portugal in command of a fleet of 13 ships bound for India. Following a westerly course down the coast of Africa, he was carried towards S. America, landing in April on the coast of Brazil, of which he took possession for the king of Portugal. Off the Cape of Good Hope in May four of his vessels were lost in a storm; he reached Mozambique in July, and in Sept. landed in India where he made contact with the ruler of Calicut and he established trading relations. He visited Cochin and Kananur before returning to Lisbon in 1501.

Cabrera, RAMON (1806-77). Spanish soldier. Born at Tortosa in Catalonia, Aug. 31, 1810, he joined the Carlists on the outbreak of the Civil War in 1833. Soon distinguished as a pitiless but able leader, in 1837 he captured Valencia, and in 1839 the success of his arms promised complete victory to the Carlists. He was made count of Morella by Don Carlos, but the following year brought disaster, and Cabrera was driven into France, subsequently removing to England. After an unsuccessful attempt to renew the Carlist war in

1848-49, he settled in England, where he died May 24, 1877.

Cabrini, MARIA FRANCESCA (1850-1917). An Italian-born U.S. missionary and saint. She was born July 15, 1850, 13th child of a farmer, at Lodi. In 1874 she was placed in charge of an orphanage at Codogno and in 1880 founded there the first institute for training nuns as missionaries. Sent by Leo XIII in 1889 to the U.S.A., she set up a religious house on the banks of the Hudson; and on numerous journeys to North and Central America, as well as across Europe, she expanded the organization called Missionary Sisters of the Sacred Heart, setting up schools, orphanages, and hospitals, especially for poor Italians abroad. She became a U.S. citizen in 1909.

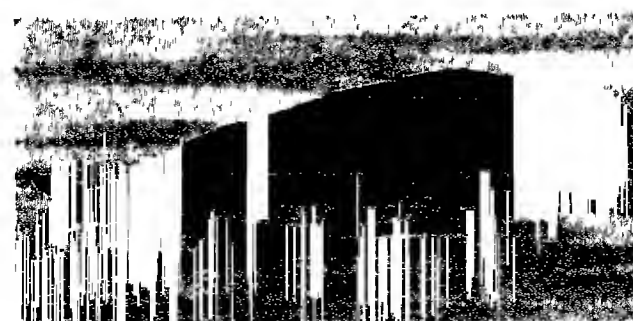
In 1910, the movement having been approved by Rome, Mother Cabrini was made superior for life. The friend of popes, of great practical ability as well as spiritual fervour, she died in Chicago, Dec. 22, 1917. She was canonised July 7, 1946, as Saint Frances Xavier Cabrini, the first saint ever proclaimed within 30 years of death, and the first U.S. saint. Her feast day is Dec. 22.

Čačak. Town of Yugoslavia, described under the anglicised spelling Chachak.

Cacao. See Cocoa.

Cáceres. Province of Spain. Bordering Portugal, and traversed by the Tagus, it is the second largest (7,705 sq. m.), but one of the least developed of Spanish provinces. It raises cattle and pigs, and N. of the Tagus there are vineyards. Pop. (1950) 549,077.

Cáceres. City of Spain. The capital of Cáceres prov., it is 20 m. S. of the Tagus, on the rly. to Mérida. The old walled town has old palaces and a Gothic church. The modern part of the city contains the palace of the bishops of Cória. There is trade in grain,



Cachalot or Sperm Whale, one of the members of the whale family

cork, bacon, leather, pottery, and phosphates. Pop. (1950) 45,429.

Cachalot OR SPERM WHALE (*Physeter macrocephalus*). One of the largest members of the whale family, the males being often 60 ft. in length. Common in most of the warmer seas, it is met with in large droves or schools, which may number more than a hundred individuals. More than a third of the whole body consists of a huge oblong head with a long narrow jaw, containing from 20 to 24 teeth, from which a kind of ivory is obtained. The head often yields as much as twelve barrels of spermaceti, while the blubber or layer of fat that envelops the body yields valuable sperm oil. Ambergris is a concretion found in its intestines and often seen floating on the sea.

Cachar. District of Assam, India, in the valley of the Surma. The rich alluvial soil and moist climate favour rice-growing, three crops yearly being raised, while the hilly parts produce tea. The chief town is Silchar. Cachar was annexed by the British in 1832. Area 2,692 sq. m. Pop. (1951) 1,115,865.

Cachin, MARCEL (b. 1869). A French politician, one of the founders of the French Communist party. Born Sept. 20, 1869, at Paimpol, Brittany, he became a school teacher but abandoned that profession for politics in 1891, when he joined the Socialist party, becoming the head of its propaganda department in 1906. In 1918 he was made editor of *L'Humanité*, an office he retained after the journal was taken over by the Communist party following its formation in 1920. He was imprisoned several times for attacks in his paper, e.g. on the govt.'s Ruhr policy in 1923 and the Riff campaign, 1927-28; and in 1934 gave his paper's support to the Communist party's advocacy of a "popular front." Elected a deputy in 1914, he retained his seat until 1932; he became a senator in 1935. He spent the period of the Second Great War in Brittany, and in 1945 was again elected a deputy.

Cachoeira. Town of Brazil, in the state of Bahia. It stands on the Paraguassu river and the Bahia Central rly., 55 m. N.W. of Bahia, with which it has steamboat communication. It exports tobacco, coffee, and sugar, and has cotton and cigar factories.

Cacodaemon (Gr. *kakos*, bad; *daemon*, spirit). Evil spirit, demon, or devil of inferior rank. In early times demon signified any spirit or being from another world, and the word cacodaemon was used

specifically for a bad influence. It was employed thus by Nashe and by Shakespeare, but has fallen into disuse with the common restriction of demon to an evil spirit. See Demonology.

Cacoon Antidote (*Fevillea cordifolia*). A perennial evergreen climber of the family Cucurbitaceae. A native of tropical America, it has a round gourd-like fruit with a woody shell, containing about a dozen large flat seeds. These are oily, intensely bitter to the taste, and have purgative and emetic properties which cause them to be used by the negroes in Jamaica for various complaints. They are also considered antidotes to poison.

Cactus (*Cactaceae*). A family of fleshy, thickened plants, leaves being absent or represented by more or less abundant sharp spines. They are globular or column-like with many angles, or flattened and jointed. The flowers are solitary, stalkless, and brightly coloured, with many sepals and petals in numerous rows. They have several stamens, a single pistil with several stigmas, and succulent fruit, often containing refreshing and sub-acid juice. They are all natives of the hot, dry regions of the American continent, but many have been introduced to similar regions in various parts of the world. Their structure enables them to store up moisture for long periods.

In many of the genera the globular or cylindrical plant body is boldly sculptured into vertical ridges, which bear the spines. The walls of all the internal cells and tissues are thickened, so that trans- fusion of fluids is slow, the result

being to prevent the loss of moisture. There are internal air-channels to supply the tissues, fresh supplies being taken in through the stomata only in damp or misty weather, when the ridges separate more widely and the intervening grooves become shallower. The absence of leaves not only obviates the danger of transpiration, but with the substitution of spines protects their substance from browsing animals.

A species of cactus called opuntia, commonly referred to as prickly pear, was introduced into Australia early in the 19th century as a food for the cochineal insect, and from a mistaken idea that the plant would help to bind sandy soil. The opuntia spread so rapidly that it soon covered some 50,000 sq. m. of territory, including much grazing land. The plant was only brought under control by the introduction from N. America of the cactoblastis moth, which feeds ravenously on cactus. See Mammillaria; Melocactus; Opuntia; Phyllocactus.

Cacus. In Roman mythology, a three-headed giant. A son of the god Vulcan, his haunt was a cave on Mt. Aventine in Italy. As Hercules was passing through the country with the oxen he had taken from the monster Geryon, Cacus stole some of the herd and thought to avoid discovery by dragging the oxen backwards into his cave so that the hoof-marks suggested they were leaving it. But Hercules discovered the theft when the lowing of the rest of the oxen was answered by those within, and he slew the monster.

Cadastral Survey. A register of the real estate of a country. It gives details of the extent, ownership, and value of each piece of land. Domesday Book is the most comprehensive early example; the modern Ordnance Survey carries out the same principle.

Cadbury. Name of a Quaker family of cocoa manufacturers, descended from a tenant farmer of Uffculme, Som., who died in 1557. Richard Tapper Cadbury settled in Birmingham, 1794, and his son John began there the business which has become world-famous. His sons, Richard (b. 1835, d. at Jerusalem, March 22, 1899) and George (1839-1922), took control

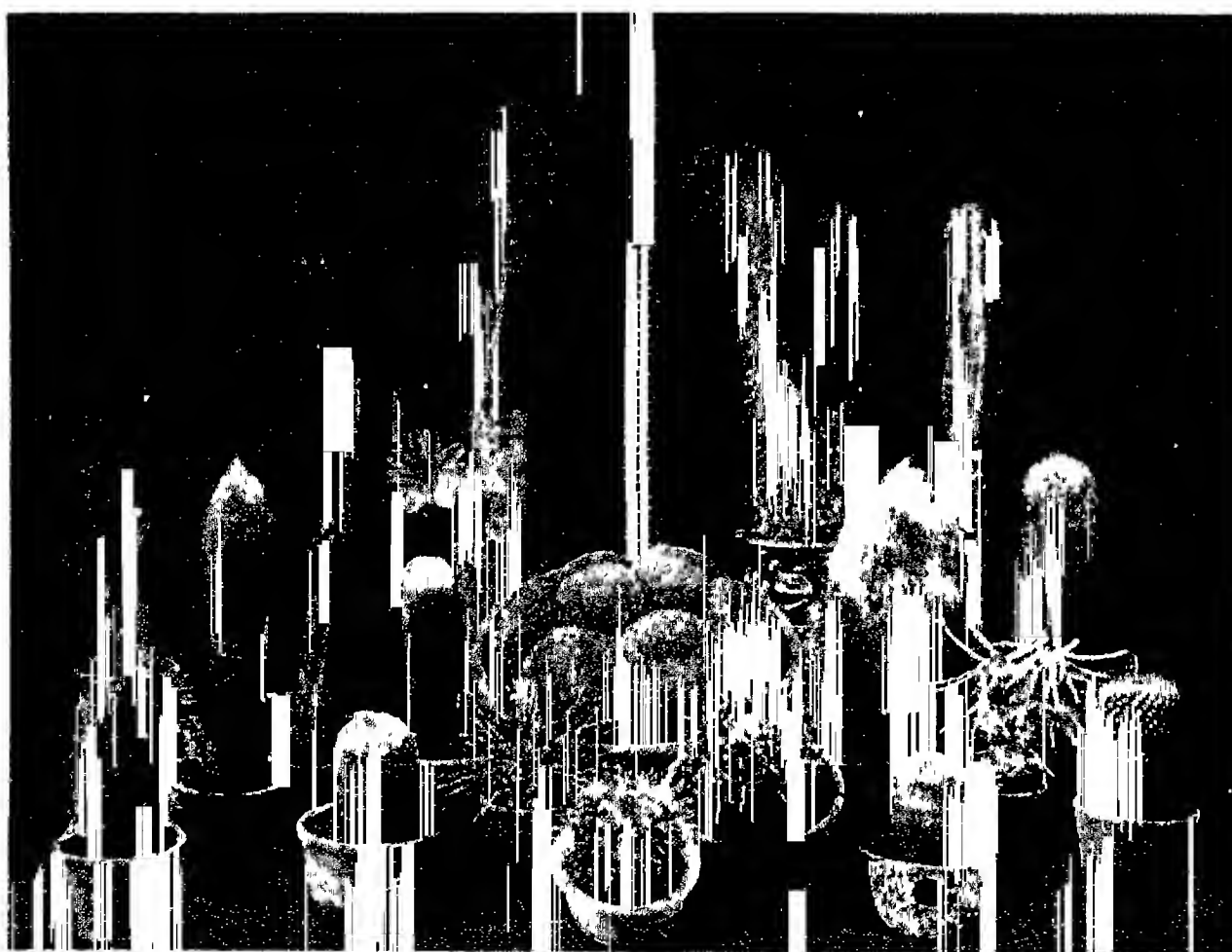


George Cadbury, Richard Cadbury,
British manufacturers
Whitlock Mowll

in 1861, when the firm employed a dozen workers. In 1879 they founded for their business the industrial and residential suburban town of Bournville (*q.v.*); and when the firm combined with J. S. Fry & Son, of Bristol, 1919, they were employing about 4,000 work-people. Both brothers achieved much social work of enduring value, and in 1901 George Cadbury became chief proprietor of The Daily News (*q.v.*). Dame Elizabeth Mary (1858-1951), wife of George, was a prominent educationist and advocate of peace by international arbitration. She was president in 1925 of the National Council of Evangelical Free Churches. Consult R. Cadbury of Birmingham, Helen Alexander, 1913; George Cadbury, A. G. Gardiner, 1923; The Firm of Cadbury, 1831-1931, I. A. Williams, 1931.

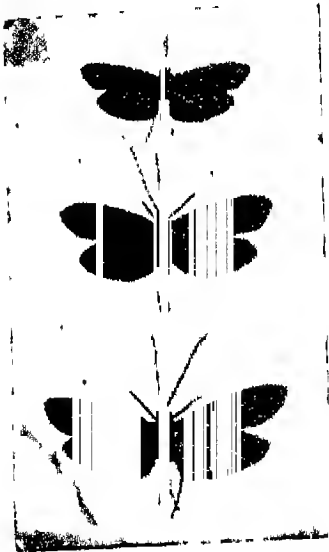
Cadder. Parish and town of Lanarkshire, Scotland. It stands on the Forth and Clyde Canal, 1½ m. N.E. of Bishopbriggs. It contains remains of the wall of Antoninus and of Robroystone, associated with Wallace. Pop. (1951) 27,113.

Caddis Fly. Order of hairy-winged insects (Trichoptera), rather like light and graceful moths. The eggs are laid in a jelly-like mass on the surface of ponds or on water weeds, and the insect in its larval and pupal stages is aquatic. The larva or caddis worm builds



Cactus. Specimens of these prickly plants, native to the deserts of America

cases or tubes in which it lives, composed of bits of wood, tiny shells and pebbles, leaves, twigs,



Caddis Fly. Top, *Phryganea minor*; centre and lower, *P. grandis*

etc. The interior of the tube is lined with silk, and the structure is just long enough to accommodate the insect.

The head and legs of the larva project at one end, while the long segmented abdomen is kept covered and protected.

When the time for pupation arrives, the caddis worm closes the ends of the tube with silk, or by attaching small stones, and passes into the resting stage. When this is almost complete, the pupa emerges from the tube and moves about in the water for a time before coming to the surface, where it is transformed into the perfect insect.

Cade, OIL OF, OR JUNIPER TAR OIL. Dark, reddish-brown, or nearly black liquid obtained by the destructive distillation of the wood of *Juniperus oxycedrus*, the European juniper tree. It is used as an application in skin diseases.

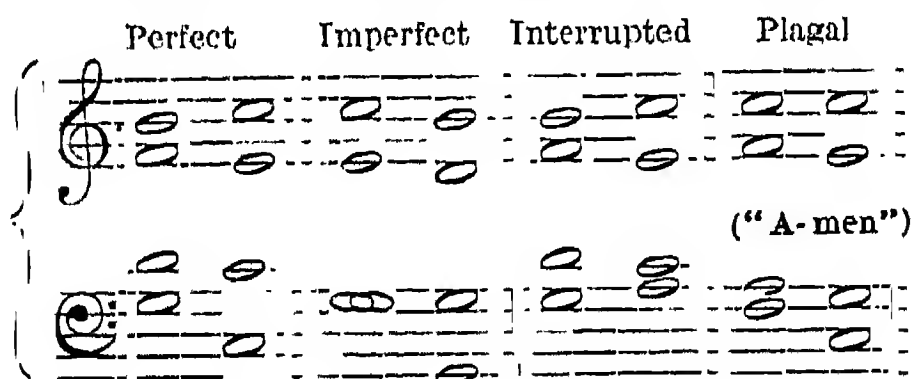
Cade, JACK (d. 1450). English rebel. His early life and personality are obscure, but that he was a man of substance is proved by the Act of Attainder passed in 1451. He was known as Mortimer, and his followers were the yeomen and smaller landed proprietors of Kent and Sussex. The rising, which was political, and not social, in its aims, took place in May, 1450. After defeating the king's troops at Sevenoaks, Cade marched on London and entered the city.

Although the rebels abstained from plunder the citizens were alarmed at Cade's demand for money; and on his retirement to Southwark the lord mayor closed

London Bridge. The battle for re-entry was unsuccessful, and negotiations between Archbishop Kemp and Cade resulted in the rebels agreeing to return home. Cade himself refused to acknowledge defeat and, becoming a fugitive with a price on his head, fell fighting at Heathfield, Sussex, July 12, 1450. Consult *True Story of Jack Cade*, J. Clayton, 1909.

Cadenabbia. Village and health resort of Italy, in the prov. of Como, on the W. shore of Lake Como. It contains Villa Carlotta, with statuary by Canova and Thorwaldsen.

Cadence (Lat. *cadere*, to fall). In music, the termination of a phrase or section analogous to punctuation in literature. Four chief types of cadence are: (1) perfect: dominant chord and tonic chord = a full stop; (2) imperfect: perfect cadence reversed = a comma or semicolon; (3) interrupted: dominant chord and some chord less expected than the tonic = a dash or other sign indicating an unfinished sentence; (4) plagal: subdominant chord and tonic



Cadence. Examples of the four types of cadence

chord = a full stop, but not so decisive as the perfect cadence. See Intonation.

Cadency. In heraldry, the art of distinguishing the position of a bearer of arms in his branch of a family. In early feudal heraldry this was done by a wide system of differencing, but the label was adopted to distinguish the shield of the eldest son. The recognized marks of cadency are placed in the upper part of the shield as follow: eldest son a label, second a crescent, third a mullet, fourth a martlet, fifth an annulet, sixth a fleur-de-lis, seventh a rose, eighth a cross moline, ninth a double quatrefoil. See Heraldry.

Cadenza. In music, (1) ornamental passage for a solo instru-

ment or voice, embellishing a pause; (2) towards the end of a concerto movement, an opportunity for free display of technique by the soloist.



Cader Idris. View of the ridge and precipitous sides of this Merionethshire mountain above Lake Tal-y-Llyn
Frith

Cader Idris (Chair of Idris). Fifth highest mountain of Wales. In Merionethshire, 4 m. S.W. of Dolgelly, it consists of a long, precipitous ridge. Its summit, Pen-y-gader, 2,927 ft. high, commands a magnificent view. By tradition, anyone who sleeps a night in the Chair awakes either poet or madman.

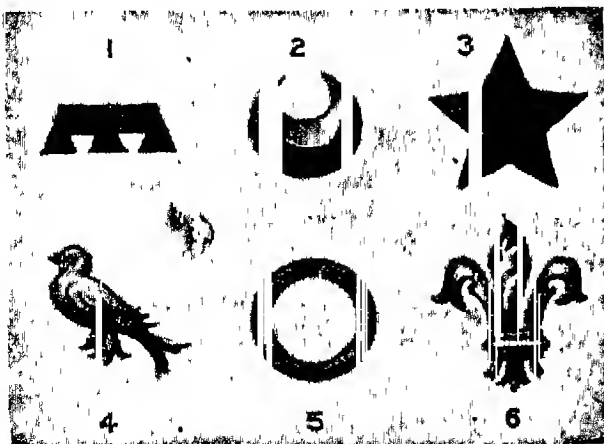
Cadet (Fr., younger brother). Term used in Great Britain to describe those serving in pre-service training units and undergoing training with a view to taking a commission in the navy, army, or air force.

In peace time cadets intending to take commissions in a branch of the regular army are trained at the Royal Military Academy (*q.v.*), Sandhurst (where education is free)

after six months' service in the ranks. Cadets intended for national service commissions are trained at the Mons (Aldershot) and Eaton Hall officer cadet schools.

In peace, naval cadets receive training at the Britannia Royal Naval College, Dartmouth, with the Dartmouth sea-going training squadron, and at a naval air station. Cadets for the air force are trained at the Royal Air Force College, Cranwell (*q.v.*).

There are also large numbers of cadets in the officers' training corps of universities and in contingents of the Combined Cadet Force. The Combined Cadet Force was formed in 1948 as a successor of the Junior Division of the Officers Training Corps



Cadency. 1. Label. 2. Crescent. 3. Mullet. 4. Martlet. 5. Annulet. 6. Fleur-de-lis

organized in 1908, and continued as the Junior Training Corps. Contingents of the Combined Cadet Force are formed in schools in which education is continued to the age of 17 years and above, and consist of a basic section providing training to the standard of Certificate A, part 1, and naval, army, and air force sections. Cadets graduate from the basic section to one of the service sections for advanced training.

The Army Cadet Force (*q.v.*) consists of boys receiving pre-military training who are ineligible for the Combined Cadet Corps. Other organizations recognized as cadet corps include the Sea Cadet Corps and the Air Training Corps.

Cadets (Russian Kadets). Name of a former political party in Russia, abbreviation for Constitutional Democrats (K.D.). It was formed in 1905 by liberals, who wished to set up a constitutional assembly, to be modelled on the English parliamentary system, to be used for the introduction of civil rights and liberties. In the first Duma, 1906, the Cadets were the largest group. When, after a short time, the Duma was dissolved they adjourned to Viborg (Viipuri), where they issued a manifesto calling for passive resistance until the Duma was restored but met with no response.

In the 3rd Duma, 1907, they acted as a parliamentary opposition, and in the fourth, 1914-17, they joined a bloc, composed of all Russian parties except the extreme Right, the object of which was the strenuous prosecution of the war. After the Revolution, in which they took a leading part with Miliukov as their leader, they held

several portfolios in the various Kerensky cabinets; but the Bolsheviks became increasingly hostile to them, and after the Lenin-Trotsky coup of Nov., 1917, they were proscribed as counter-revolutionaries.

Cadi. Arabic title for a judge of summary jurisdiction in Mahomedan countries. He is required to be learned in the Koran and the religion of Islam, and the terms of his appointment vary considerably.

Cadiz. Maritime province of Spain. It is bounded N. by the province of Seville, E. by the Mediterranean and Malaga prov., S. by the Straits of Gibraltar, and W. by the Atlantic, Cape Marroqui being the southernmost point of the mainland of Europe. Area, including Ceuta (*q.v.*), 2,827 sq. m. Flat and marshy in the W., and mountainous in the E., it is watered by the Guadalquivir, Guadalete, and Barbate. Though the country is subject to droughts, the climate is temperate, and the soil fertile. Cadiz is one of the wealthiest provinces of Spain, its wine being world-famous, while it produces also olives, fruits, fish, and salt. Among its famous places are Cadiz, the capital; Jerez, Gibraltar, and Algeciras, and Cape Trafalgar. Pop. (1954) 755,833.

Cadiz (Phoen. *Agadir*, Lat. *Gades*). Seaport of S.W. Spain. The capital of the prov. of Cadiz, it stands at the end of a narrow isthmus projecting 5 m. into the Bay of Cadiz, 95 m. by rly. S. of Seville. Approached by a single railway and one road, it

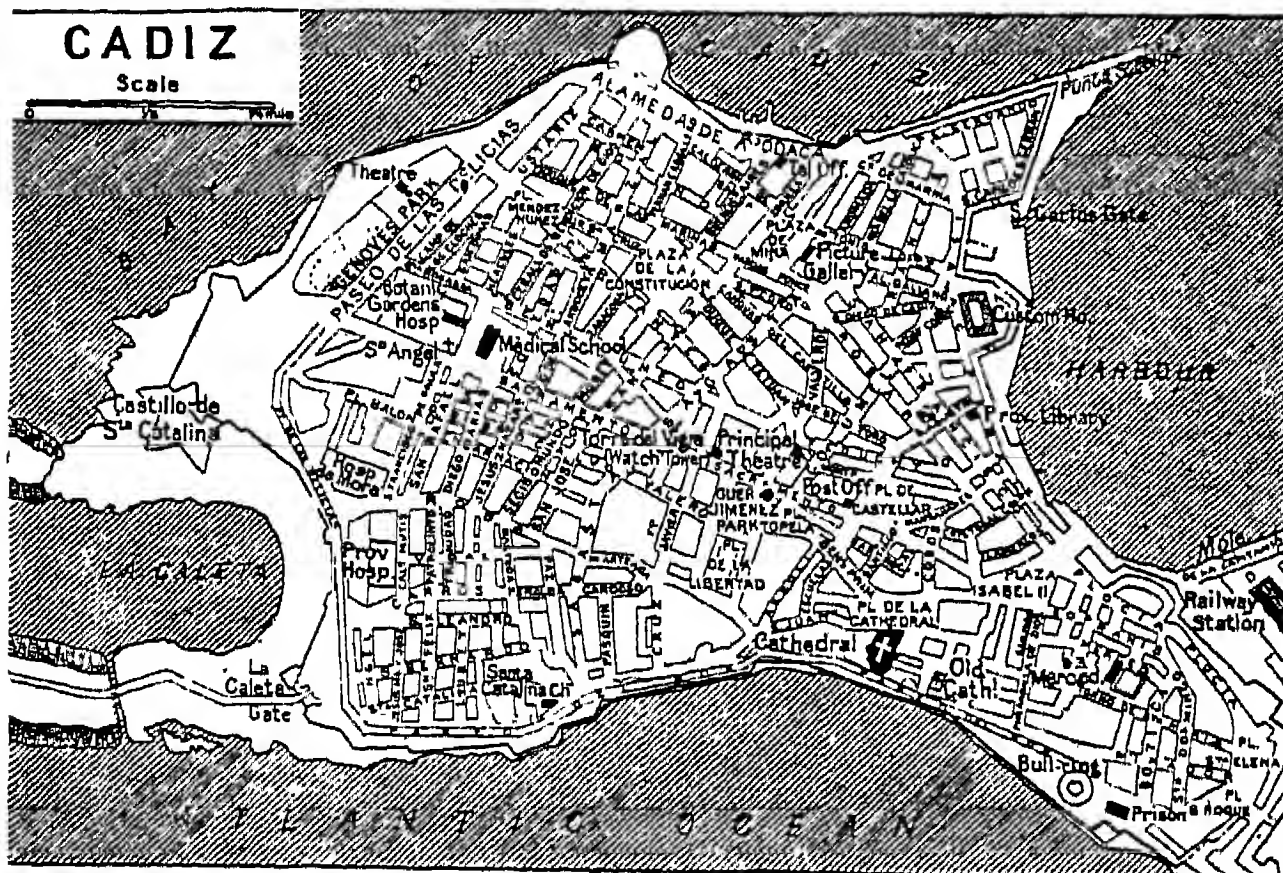
owes its importance to its geographical position and fine natural harbour, which give it almost unique advantages for maritime traffic, especially with America. One of the oldest ports and cities in the world, it is now a fortress, a naval arsenal, the see of a bishop, and a centre of art and industry. It has an equable climate, but poor water supply. Its picturesque, white-washed or marble-built houses are high, with turrets and cisterns on the roofs. There are many public gardens and promenades, and a botanic garden. The absence of vehicular traffic and street noises, and the wide expanse of sea-views and the sea-breezes have gained for Cadiz the popular name of the Venice of Spain.

Its public buildings are mostly modern, a great part of the old town having been burned in 1596. It has two cathedrals, a picture gallery, a provincial library and museum, hospitals, medical and nautical schools, an observatory, theatres, and bull-ring. A watch tower, the Torre del Vigia, stands in the centre of the town, and in the church of Santa Catalina is the picture on which Murillo was engaged when he met his death. There is trade in sherry, olives, salt, and fruit. Pop. (1954) 105,366.

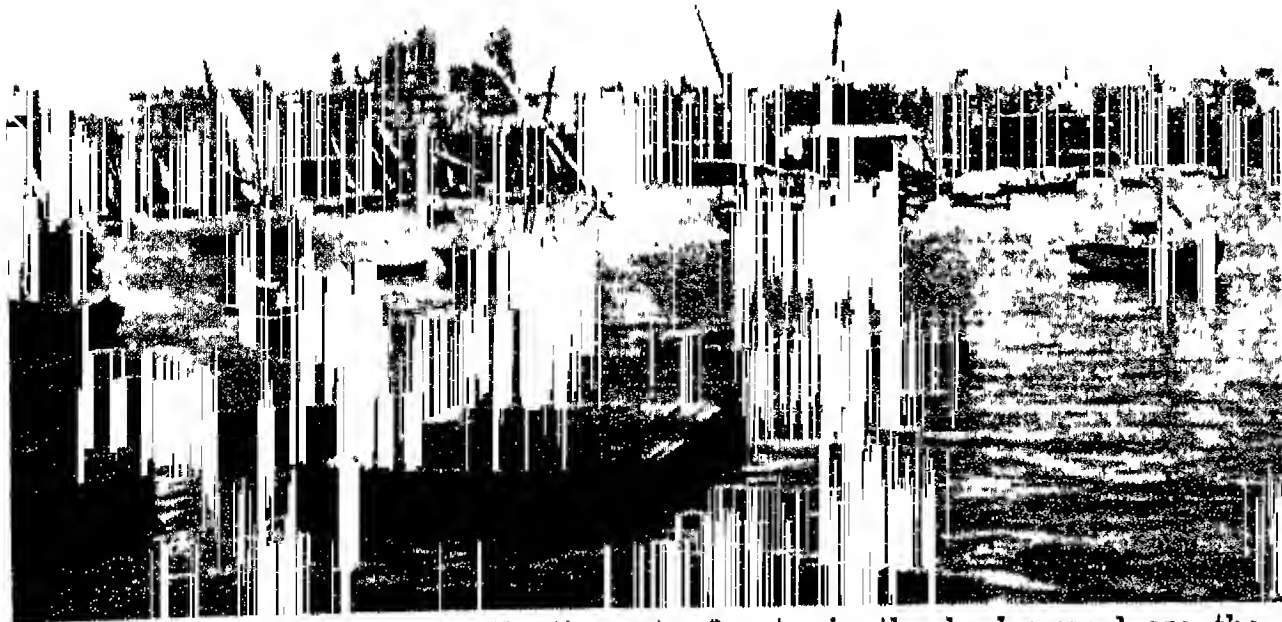
Founded by the Phoenicians, traditionally about 1100 B.C., Agadir was by the 7th century B.C. a famous mart for tin, silver, and amber. The Carthaginians occupied it about 501. Hamilcar, Hannibal, and the Scipios fitted out fleets and armies here. Pompey and Caesar disputed its possession. In 49 B.C. it acquired full rights of Roman citizenship, and retained its high commercial importance throughout antiquity. Sung by Latin poets, its amenities, cookery and dancing-girls were famous in Roman times; its fish and preserved meats were celebrated in Athens in the 4th century B.C., and in Rome in the 2nd century A.D. Yet in the Middle Ages, Cadiz, the Jezirat-Kadis of the Arabs, disappeared from the pages of history. When Alphonso X of Castile captured it in 1262, he had almost wholly to repeople it, and its new prosperity did not begin until the discovery of America. Attacked by corsairs, sacked by the English, besieged by the French, it yet recovered so that in 1765 it rivalled London in wealth, but wars and the loss of the Spanish-American colonies again ruined it. Its trade was still further depressed by the competition of Gibraltar and Seville. At Cadiz in



Cadiz arms



Cadiz. Plan of this Spanish seaport, one of the oldest maritime cities in the world



Cadiz, Spain. View of the Atlantic water front; in the background are the towers of the new (18th century) cathedral

1812 the first liberal constitution of Spain was promulgated. The city was taken by Gen. Franco's troops at the outbreak of the civil war in 1936.

Cadiz, EXPEDITIONS AGAINST. Owing to its position in the 16th and 17th centuries as the chief harbour of the Spanish fleet, this port was several times attacked by the English. On April 19, 1587, just as the Armada was about to sail, Sir Francis Drake's fleet entered it. He destroyed by fire or otherwise 33 waiting Spanish warships, and carried off four others that were filled with provisions. In June, 1596, the feat was repeated with even greater success. The English fleet under Sir Charles Howard and the earl of Essex, with Sir Walter Raleigh as their chief officer, sailed in and seized two ships, the others being destroyed by the Spaniards before the English could reach them. The town was then taken by assault, but the proposal to hold it as an English possession being abandoned, the invaders started a disastrous fire in it and left. This operation practically ended Elizabeth's long struggle with Spain.

In Oct., 1625, Cadiz was attacked by a fleet led by Edward Cecil, Viscount Wimbledon. The Spanish ships were driven after a fight into the inner harbour, but the Spaniards succeeded in repelling a further attack, while the troops who had disembarked were overcome by the supplies of drink they found. The garrison having been strengthened, the English gave up the idea of a siege and withdrew.

The next operation took place during the war of the Spanish Succession. In July, 1702, a large fleet, English and Dutch combined, sailed from Spithead under Sir George Rooke, the accompanying troops being led by the duke of Ormonde. It arrived before the port, but Rooke declined to attack

the town, though one or two adjacent places were plundered.

Cadiz was closely watched by the British during the Napoleonic wars. It was blockaded at times, while in Oct., 1800, an attempt to seize it was abandoned on the news that the plague was raging in the town. After the Spaniards had become the allies of Britain it was besieged in vain by the French between 1810 and 1812. An engagement at sea between the French and the Spaniards on July 20, 1840, is sometimes called the battle of Cadiz. In it the Spaniards were badly defeated.

Cadiz, BAY OF. Inlet of the Atlantic on the S.W. coast of Spain. It is divided into an inner and an outer bay, and has a breadth of 7 m. At the point of the peninsula to the S.W. is the city of Cadiz, and at the N. entrance stands the town of Rota. La Carraca, on the E. shore of the inner bay, contains an arsenal and shipbuilding yards.

Cadman, SAMUEL PARKES (1864-1936). American clergyman. Born at Wellington, Shropshire, England, Dec. 18, 1864, and educated at London university, he subsequently went to America. He was pastor of the Metropolitan Temple, New York, 1895-1901, going from there to the Central Congregational church, Brooklyn. He was an ardent supporter of the Y.M.C.A. He was president of the Federal Council of Churches of Christ in America, 1924-28, and radio minister of the council from then until his death, July 12, 1936. His published works include *Charles Darwin and Other English Thinkers*, 1911; *The Parables of Jesus*, 1931.

Cadmium (Gr. *cadmeia*, ore of zinc). Metallic element, discovered by Strohmeyer in 1817. Its chemical symbol is Cd, atomic number 48, atomic weight 112.41; its specific gravity, cast 8.62, and rolled 8.69; and its melting point

609.6° F. (320.9° C.). In hardness it comes between gold and tin. It may be drawn into fine wire and hammered into thin leaves. It is silvery-white with a bluish tinge, has a compact, fibrous texture, strong lustre, and will take a high polish. In appearance it is similar to tin and has a similar crystalline structure, causing it to give out the same peculiar crackling noise when a strip or rod of it is bent. Heated in air, it burns quickly, giving off brown fumes of the oxide. It dissolves in hydrochloric and sulphuric acids, and is readily attacked by nitric acid.

It occurs in nature as the mineral greenockite (CdS), but is more commonly found in zinc, lead, or copper ores, from which it is recovered as a by-product. Cadmium is obtained by the distillation of zinc ores as a deposit of blue powder, which consists of a mixture of the metal and its oxide. The cadmium is then separated from the remaining zinc by repeated distillation or by electrolysis, using a solution of a soluble cadmium salt, either the chloride or the sulphate. Cadmium is used as an electro-deposited rust-proof coating on steel, and cadmium-base alloys containing silver and copper have been developed for bearing purposes. Cadmium is also a constituent of brazing solders, soft solders, and fusible alloys, and large tonnages are used as a 1 p.c. cadmium-copper alloy for trolley wires, the cadmium increasing the strength of copper without substantially reducing its conductivity for electricity.

Cadmium, marketed in small sticks of metal, or as a yellow powder (the sulphide), is also used for the preparation of yellow and red pigments for calico printing and for the colouring of fancy soaps and porcelain; while it furnishes a brilliant and permanent yellow favoured by artists.

Cadmus. In Greek legend, son of Agenor, king of Phoenicia. When his sister Europa was abducted by Zeus, Cadmus was sent by his father in search of her. After a long and unavailing search Cadmus consulted the oracle of Delphi, which bade him follow a cow which he should find, and build a city on the spot where she lay down. The cow halted in Boeotia, and Cadmus, in endeavouring to get water from a spring for a thanksgiving sacrifice, came into conflict with the dragon that guarded it. With the help of Athena he overcame the monster, and on the advice of the goddess sowed its teeth in the

ground. A crop of armed men called Sparti (sown) sprang up, who fought until only five were left, who helped Cadmus to build the city of Thebes.

Cadmus married Harmonia, daughter of Aphrodite, but owing to the persecution of Hera, wife of Zeus, he and his wife were forced to leave Thebes. Begging the gods to remove them from the world, they were changed by Zeus into serpents and placed in Elysium. Cadmus was said to have introduced the Phoenician alphabet and other useful inventions into Greece.

Cadogan, EARL. English title borne since 1800 by a family of Irish descent. The 1st earl, an able soldier, was made a baron and in 1718 an earl. On his death the earldom became extinct, but the barony was inherited by his brother. The latter's son was made Viscount Chelsea and Earl Cadogan in 1800. The 2nd baron, previously Gen. Charles Cadogan (1691-1776), married the daughter of Sir Hans Sloane, and thus brought into the family the valuable estates in Chelsea. An eldest son is known as Viscount Chelsea. William, 7th earl, was born in 1914 and succeeded his father in 1933. *Pron.* Ca-dug'-gan.

Cadogan, WILLIAM CADOGAN, 1ST EARL (1675-1726). British soldier. Born in Dublin, he entered the army of William III. He served under Marlborough and was present at Blenheim, Ramillies, and other battles. He discharged his duties as quartermaster-general 1706-11 with singular ability, and was one of the best staff officers the British army ever had. To Cadogan was chiefly due the defeat of the Jacobite rising in Scotland in 1715, and he was raised to the peerage the following year, and made an earl 1718. He was M.P. for Woodstock, 1705-16, and British minister in Holland, 1714-19. He died at Kensington. July 17, 1726, and was buried in Henry VII's chapel, Westminster.

Cadogan, GEORGE HENRY CADOGAN, 5TH EARL (1840-1915). British politician. Son of the 4th earl, and great-nephew of the 1st duke of Wellington, he was born May 12, 1840, and educated at Christ Church, Oxford. Elected Conservative M.P. for Bath, 1873, he succeeded to the peerage in that year and was under-secretary for war 1875-78; for the colonies, 1878-80; lord privy seal, 1886-92; and lord-lieutenant of Ireland, 1895-1902. His estates in Chelsea, of which he became the first mayor in 1900, made him one of

the largest ground landlords in London. He died March 6, 1915.

Cadogan, SIR ALEXANDER GEORGE MONTAGU (b. 1884). British diplomatist. Youngest son of the 5th Earl Cadogan, he was born Nov. 25, 1884, and was educated at Eton and Oxford. Attaché at Constantinople, 1909, and at the foreign office, 1912 and 1914, he did special work in connexion with the League of Nations after the First Great War. Minister to China 1933-35, he became ambassador to that country, 1935-36. He was deputy under-secretary of state for foreign affairs, 1936-37 permanent under-secretary, 1938-46. Created K.C.B., 1941, he was permanent representative of the U.K. on the security council of the United Nations, 1946-50. He was given the O.M. in 1951.



Sir Alexander Cadogan
British diplomatist

Cadogan Square. A London square. S. of Hans Place and W. of Pavilion Road, it was laid out in 1882-83. It contains some fine houses with noteworthy porticoes. With Lennox Gardens it covers the site of Prince's Cricket Club and The Pavilion, an ornamental mansion built by H. Holland, the architect of Hans Town, as this part of Chelsea used to be called, with grounds laid out by "Capability" Brown. It forms part of the London estate of Earl Cadogan.

Cadorna, COUNT LUIGI (1850-1928). Italian soldier. The son of Count Raffaele Cadorna, the leader of the Italian army that invaded the papal states in 1870, he was born at Pallanza, Sept. 4, 1850. Educated at the military school, Turin, he entered the Italian army in 1868. When Italy, in May, 1915, entered the First Great War, Cadorna, appointed C.-in-C., held that position until immediately after the battle of Caporetto, 1917, when he was superseded. After representing Italy on the military council at Versailles, he retired in 1918. He published a life of his father, 1922. A marshal from 1924, he died Dec. 23, 1928.



Count Cadorna,
Italian soldier
Vandyk

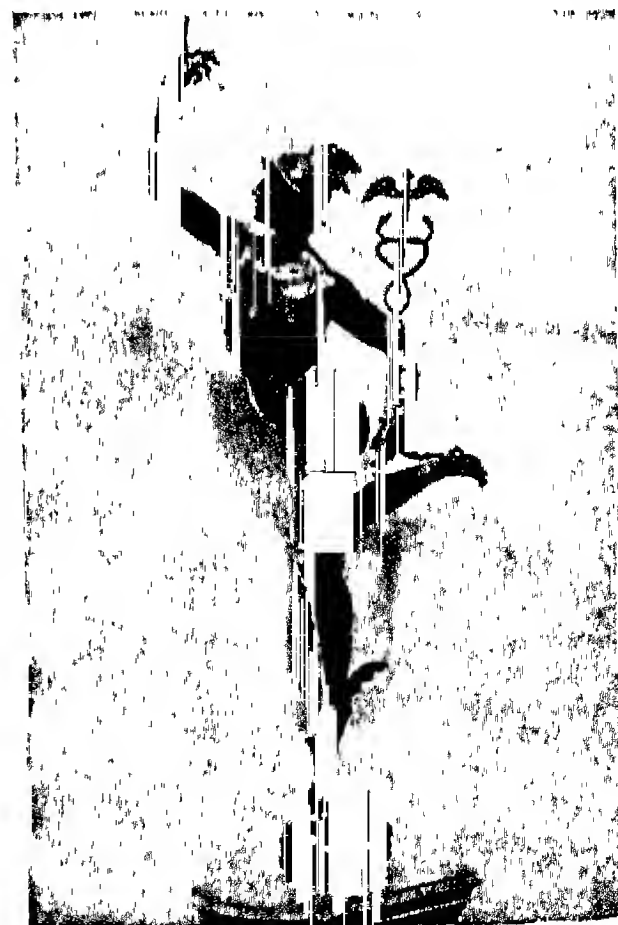
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Cadoudal, GEORGES (1771-1804). French insurgent. Born in Morbihan, Jan. 1, 1771, the son of a Breton peasant proprietor, he was roused by the revolutionary attack on the Church to organize a counter-revolution in Morbihan in 1793. On its suppression he joined the army of La Vendée, returned to Morbihan after the defeat of Savenay, 1793, and was captured by the republicans. He escaped, and as leader of the Chouans carried on a guerrilla warfare until 1800, when he was forced to take refuge in England. On his return to France, 1803, continuing to plot against Bonaparte, he was captured and, refusing to ask pardon, was executed in Paris, June 25, 1804. *See* Chouans.

Cadoxton. Eccles. district of Glamorganshire, Wales. It is 7 m. S.W. of Cardiff by rly. Coal and iron are worked here. Pop. 6,548.

Cadre (French, frame). Military term for the basic organization of a unit—the "skeleton," which is clothed by calling up the rank and file on mobilisation. British infantry battalions stationed at home are often called cadres, because they are unfit to take the field until their reserves are called up. The headquarters of a division is in peace a mere framework of what it is in war. The term cadre is also applied to a squad of privates selected for training as n.c.o.s. *See* Army, British.

Caduceus (Latinised form of Gr. *kērykeion*, herald's staff). In Greek mythology, the rod borne by Hermes, the messenger of the gods, as the symbol of his power. Two serpents were entwined round the



Caduceus. Bronze statue of Mercury, at Florence, holding the caduceus

lower end of it. With the caduceus Hermes conducted the souls of the dead to Hades. In modern times, as the symbol of Mercury, the Roman counterpart of Hermes and the god of commerce, the caduceus is sometimes adopted as the device of business houses.

Cadurci. Name of the inhabitants of Gallia Aquitania, celebrated for their manufactories of linen, etc. Their capital was Divona, now Cahors (*q.v.*), a part of which is still known as Les Cadurcas.

Cadwaladr. The name of two Welsh princes. The first reigned over the Britons in Wales in the 7th century, fought against Oswy of Northumbria and other English kings, and died in 664. A famous figure in Welsh legend, he was later regarded as a saint. The second Cadwaladr was a prince of the 12th century. A son of King Gruffyd, he passed much of his time in tribal wars and in struggles with his brother Owain. At one time a fugitive in Ireland, he was reinstated by Henry II, 1157, but in 1165 joined with the rest of Wales in opposing Henry's invasion. He died in March, 1172, and is celebrated in the Welsh chronicles as a patriot. He is buried along with Owain in Bangor cathedral.

Caecilian (Lat. *caecus*, blind). Worm-like amphibian belonging to the order Gymnophiona. Caecilians



Caecilian, a worm-like amphibian

occur in S. Asia and Africa and in Central and S. America. They burrow in the ground, and only the larval stage is passed in the water.

Caecum (Lat. *caecus*, blind). The beginning of the large intestine. Into it open the ileum and the vermiform appendix (*q.v.*).

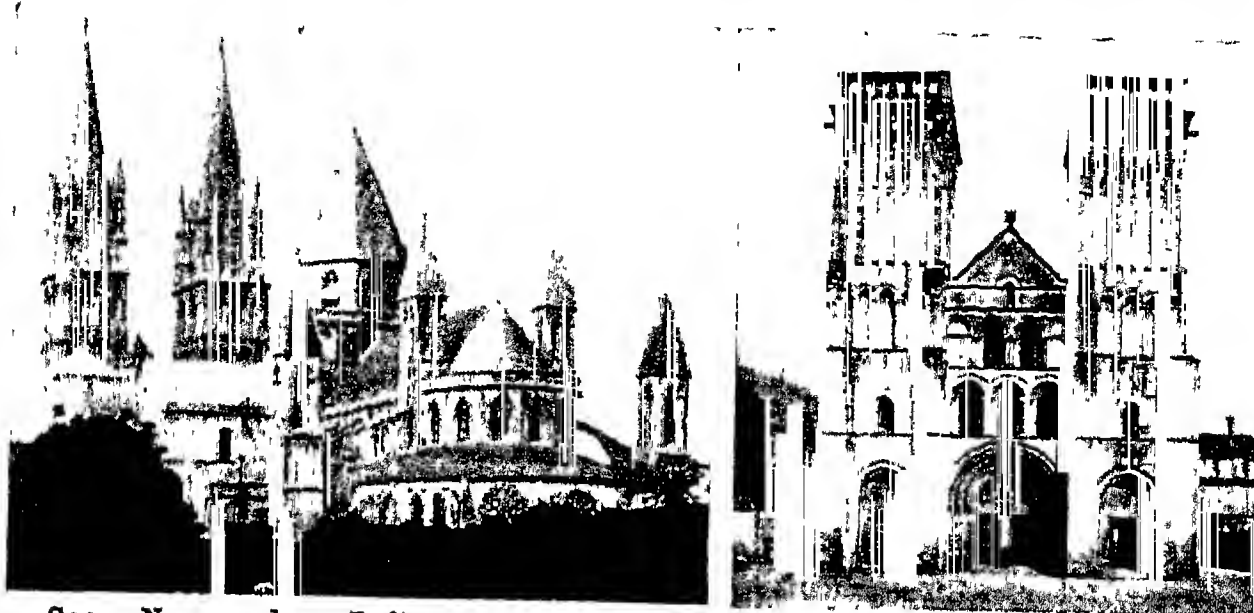
Caedmon (d. c. 675). Anglo-Saxon poet. According to Bede, he was a labourer at S. Hilda's monastery at Whitby. Ignorant of song, when the harp was passed from hand to hand he withdrew to the stable to tend the cattle. While he slept he had a vision bidding him sing of the Creation, and thus inspired he composed verses, which Bede gives in Latin form. Caedmon on the advice of S. Hilda became a monk at Whitby, where he died.

A 10th century MS., now in the Bodleian Library, contains a series of metrical paraphrases called The Caedmon Poems. They were discovered by Francis Junius, a friend of Milton, in 1655, and later

criticism dates them in the main from the 9th century. These paraphrases were translated into modern English by B. Thorpe, 1832, and by C. W. Kennedy, 1916.

Bibliography. Epic of the Fall of Man: a Comparative Study of Caedmon, Dante, and Milton, S. H. Gurteen, 1896; Caedmon MS. of Anglo-Saxon Biblical Poetry, ed. Sir Israel Gollancz, 1927.

Caen. City of Normandy, France. It stands on the Orne, about 9 m. from its mouth in the



Caen, Normandy. Left, Abbaye-aux-Hommes, a church founded by William the Conqueror: right, Abbaye-aux-Dames, which was slightly damaged in the fighting of 1944

English Channel, and is the capital of the department of Calvados. It is a river port, having good accommodation for ships, and a fishing centre. A canal, as well as the river, connects it with the English Channel. The imports include coal and timber, and the exports are stone, iron ore, and the agricultural products of Normandy. The famous Caen stone is quarried in the neighbourhood.

Caen is chiefly interesting historically for its connexion with William the Conqueror. Here is the church of S. Étienne, also known as the Abbaye-aux-Hommes, which he founded as a penance and which once contained his body. The Abbaye-aux-Dames was founded by his wife Matilda.

Caen proper is on the left bank of the Orne; Vaucelles, a suburb, on the right. Pop. (1954) 67,851.

As the hub of twelve major roads, Caen was a key town in the Allied invasion of Normandy in 1944. Its capture was an important strategic step, and it was, therefore, fiercely defended by the Germans, who concentrated all their available armour in that sector. Both sides suffered heavy casualties in men and loss of material before the town finally fell to British and Canadian units. On June 25 the British 2nd army opened an attack S.W. of Caen towards the river Odon, and drove a salient into the enemy positions. Three days later

British armour and infantry crossed the river and established a bridgehead towards the Orne river, which withstood several sharp counter-attacks. Heavy bombardment, in which naval fire from H.M.S.S. Rodney, Roberts, and Belfast took part, together with heavy air attack by the R.A.F., was followed on July 8 by a British and Canadian three-pronged attack, and next day most of the town was in Allied hands.

The heart of Caen was destroyed by the ruthlessness of the retreating Germans and the weight of Allied bombing from the air. The 14th-century cathedral of S. Peter was reduced to a shell. The church of S. John and the hôtel de ville were totally ruined. The university, dating from 1436, was severely damaged. Restoration, begun 1948, was completed by 1956, much of it in local stone. The university was replanned to take 3,500 students.

F.M. Montgomery's generalship at the battle of Caen, which had been criticised as over-cautious, was described as masterly in Gen. Eisenhower's official report, which added that "every foot of ground the enemy lost at Caen was like losing 10 miles anywhere else."

Caerlaverock. Coast parish of Dumfriesshire, Scotland. It stands on the river Loch, 6 m. S.E. of Dumfries. On the N. shore of Solway Firth, near the mouth of the Nith, stand the ruins of its old castle, for four centuries the seat of the Maxwells, earls of Nithsdale. Captured by Edward I in 1300, it was the original of Scott's Ellangowan. In the churchyard was buried Robert Paterson, the character who suggested Scott's Old Mortality. Pop. (1951) 710.

Caerleon. Urban dist. and parish of Monmouthshire, England. It is on the river Usk, 2 m. N.E. of Newport, on the railway. Here

is the Newport co. bor. mental hospital. Pop. (1951) 4,711. Called in Roman times Isca, it was the Roman base for the conquest and control of S. Wales. The centre of the modern town lies within the Roman legionary fortress established c. A.D. 75. Just outside the walls is the best-preserved Roman amphitheatre in Britain, excavated 1926-27 and remains of the civilian settlement that grew up round the fortress.

Caernarvon. For this town of Wales, and Caernarvonshire, see Carnarvon; Carnarvonshire.

Caerphilly. Urban dist. and market town of Glamorganshire, Wales. It is on the Rhymney, 7 m. by rly. N. of Cardiff. It has remains of a magnificent castle, built by Gilbert de Clare in the reign of Edward I, and covering 30 acres. Captured by Glendower in 1403, it came later into possession of the earls of Bute who in 1950 gave it to the nation. Coal-mining, iron working, and manufacture of woollens are carried on. Caerphilly gives its name to a co. constituency. Pop. (1951) 35,194.

Caerphilly Cheese. A hard-pressed whole-milk British cheese. It is white, and hard enough to be sliced. It is best when eaten as soon as cut, which should be about a fortnight after manufacture.

Caesalpinia. Genus of ever-green trees and shrubs of the family Leguminosae. Natives of tropical



Caesalpinia lutea,
leaves and pods

America and Asia, they are commercially important as sources of dyes—red, orange, and peach—and as tan stuffs. Their woods are chiefly known by the names of the supposed country of their origin, e.g. Brazil-wood, Lima-wood, Nicaragua-wood, and Pernambuco-wood, the produce of *C. brasiliensis* and *C. echinata*—both American species. Sappan-wood, much used in Britain and India for dyeing cotton goods, is obtained from the trunks and roots of *C. sappan*, a native of tropical Asia. The seeds of *C. digyna*, an Indian climber, yield lamp-oil; and in China the pods of several species are used instead of soap. The genus is named after the Italian naturalist Andrea Caesalpinus (1519-1603). See Divi-divi.

Caesar. Cognomen of the great Julian family in ancient Rome, which traced its descent back to Ju'ius, son of Aeneas. Its most famous representative was the dictator Gaius Julius Caesar. The family name was borne by the emperor Augustus, as the adopted son of the dictator, and by later emperors, who belonged to the family by descent or adoption, the last being Nero. Their successors, while reigning emperors, used the name as a title, but from the time of Hadrian onwards it was applied to the emperor designate. The German kaiser and the Russian tsar are forms of the word.

Caesar, GAIUS JULIUS (102-44 B.C.). Roman soldier and statesman. He was born at Rome July 12, 102 B.C., the only son of parents who both belonged to the old Roman aristocracy. Through his aunt, who had become the wife of Gaius Marius, he was the nephew of that great democratic leader, and this fact doubtless influenced Caesar in his support of the popular party. The connexion with democracy was strengthened when, in 83, he married Cornelia, daughter of Lucius Cinna, upon whom the mantle of Marius had descended.

Caesar displayed no special ability in his early years, but with the democratic party in power started his public career under favourable auspices, though the restoration of senatorial ascendancy by Sulla caused a set-back. His refusal to divorce his young wife at the command of Sulla nearly cost him his life. Considering the atmosphere of Rome unhealthy for him, his family arranged for his initiation into military service with the army in Asia (81). At the capture of Mitylene in the following year he won the civic crown, the Roman equivalent of the Victoria Cross, for saving the life of a fellow soldier at peril of his own.

Sulla's death in 78 opened the way for a return to Rome, and Caesar grasped the opportunity to gain some experience in the law courts of the capital. To perfect himself in oratory he again journeyed to the East to study under

the famous rhetorician, Apollonius Molo of Rhodes. Captured by pirates on the sea passage, and afterwards ransomed, he made good the threat he uttered to his captors by returning and having them all executed.

After another spell of military service in the war with Mithradates Caesar returned to Rome and plunged into politics in earnest, as a consistent supporter of popular measures. In 68 he became quaestor in Spain, and in 65 curule aedile, in which latter office his profuse expenditure on the public games enhanced his popularity, though it brought him to the verge of bankruptcy. This period saw the rise to power of Pompey, with whom in after years Caesar was to dis-



Gaius Julius Caesar: bust in the Naples Museum reputed to be an authentic portrait

pute the mastery of the Roman world, though as yet and for some time to come their relations were of the friendliest. His first wife having died in 68, Caesar in 67 married Pompeia, Pompey's cousin, and when in 65 the military situation in the East called for strong action he warmly supported a measure for investing Pompey with extraordinary powers.

The extent of Caesar's connexion

with the conspiracy of Catiline to overthrow the republic in 63, a conspiracy crushed by the vigorous action of the consul Cicero, remains doubtful. In the senate Caesar opposed the execution of the conspirators, who in name at least belonged to the popular party; but it is improbable that there was any substantial connexion between him and the crowd of bankrupts and desperate adventurers who made up Catiline's following. In 62 Caesar was elected to the praetorship, spending the following year as governor of Farther Spain.

The year 59, during which he held the consulship, was a memorable one for Caesar. Making common cause with Pompey, he formed with him and Marcus Crassus, the millionaire, what is known as the First Triumvirate, the idea being that this powerful combination might secure for each member certain objects which separately they could hardly hope to attain. In his capacity as consul

Caesar introduced the necessary legislation. The senatorial party bitterly opposed him, finding a convenient tool in the other consul for the year, Marcus Bibulus, who used all the obsolescent constitutional machinery of the republic to nullify Caesar's proposals. Caesar, however, carried the day, though in doing so he undoubtedly, in a technical sense, was guilty of overriding the constitution. For himself he obtained what he had long seen was necessary if he was ever to achieve the same prestige as Pompey—a great military command with extensive powers. The province of Gaul was allotted to him for five years and at a later date for five years more.

At the end of nine years he had conquered the whole of Transalpine Gaul. In 55 and 54 respectively he conducted invasions of Britain. Though without permanent military result, these expeditions to the remotest confines of the known world made a great impression upon contemporaries. At the end of 54 there was a revolt in Gaul which reached serious proportions in 52, when the Aedui, old allies of the Romans, joined the Arverni in rebellion and, under Vercingetorix, were put down only after hard fighting. The conduct of these campaigns proved Caesar to be a military genius of the highest order.

Caesar and Pompey

The progress of Caesar's successes had been viewed with the greatest alarm by his old enemies of the senatorial party at Rome, whose policy now was to set up Pompey as a counterpoise. In this they were supported by Cicero, who regarded Caesar as a subverter of republican institutions, though he reluctantly admired his abilities and personal character. Pompey, a fine soldier but of no great acuteness of mind, proved pliable material. It is true that in 55 the three members of the Triumvirate had made rearrangements apparently satisfactory to each member, Caesar securing extension of his command until Dec. 30, 49, but Pompey was undoubtedly jealous of Caesar's military successes, and the death, in 54, of his wife Julia, Caesar's daughter, added to the growing estrangement. Finally the defeat and death of Crassus, in his disastrous expedition against the Parthians in 53, removed the third member of the Triumvirate and left Pompey and Caesar face to face. In the following year Pompey became definitely identified with senatorial interests. Elected sole consul for 52, at the end of his year of office he received the province of Spain for five years.

On the other hand, Caesar's period of imperium was coming to an end, and he knew that when he returned to the status of a private citizen and had disbanded his armies, his enemies in Rome would impeach him for his unconstitutional acts. Accordingly he demanded the consulship for 48 and, not caring to trust himself in Rome, further demanded to be absolved from the necessity of the personal canvass prescribed by the constitution. These proposals were opposed by Pompey and the senate, and in the early days of 49 Caesar and his troops crossed the Rubicon, the dividing line between the provinces and Italy proper.

The Civil War

The civil war had begun; *jacta alea est* (the die is cast) were Caesar's own words as he crossed the river. After an expedition to Spain, where he defeated three of Pompey's lieutenants in six weeks, Caesar returned to Rome and had himself elected consul for 48, having been already appointed dictator. Crossing over to Greece, where Pompey had collected a large army, he routed him utterly at Pharsalus, Aug. 9, 48. The defeated general fled to Egypt, where he was treacherously murdered. Caesar, who had followed him closely, became entangled in a war in Egypt, and fell a victim to the charms of the young queen Cleopatra, who is said to have borne him a son, Caesarion.

After defeating Pharnaces, an ally of Pompey, in Asia Minor, Aug. 2, 47—an easy victory which provoked the famous dispatch *veni, vidi, vici* (I came, I saw, I conquered)—Caesar, with a brief interval in Rome, passed into Africa, there to meet and defeat at Thapsus, in 46, a re-collected Pompeian army. Another victory in the following year, at Munda in Spain, where he defeated the two sons of Pompey and the remnants of their father's party, ended the civil war.

Before this last campaign he had been able to spend some time in Rome putting things in order, and the final establishment of peace now left him free to continue his programme of administrative and domestic reforms. Among the latter was the reform of the calendar. Caesar's position had been strengthened by his being appointed dictator, in the first instance for ten years, then, in 45, in perpetuity. At the beginning of 44 he was offered a king's crown by Mark Antony at the festival of the Lupercalia, but refused it.

On his attainment to supreme power in Rome, Caesar had surprised everybody by his clemency towards his former foes, but, as

events showed, this clemency was sadly misplaced. The remnants of the senatorial party proved irreconcilable. Under the leadership of Cassius a conspiracy was formed against Caesar on the ground that he was aiming at a tyranny, and the conspiracy was joined by several who honestly believed this accusation, notably Marcus Brutus, a personal friend of Caesar. The conspirators surrounded their victim in the senate house on the Ides (15th) of March, 44, and stabbed him to death. The blow of Brutus provoked from Caesar the words, *Et tu, Brute* (Even thou, Brutus)!

Much controversy has raged round the character of Caesar. That he treated the old Roman constitution with scant respect, and that many of his acts were illegal is true. But it should be remembered that Rome had outgrown its constitution, the machinery of which, by the first century B.C., had become wholly unsuitable for the government of a world empire. Caesar's admirers point to results. His conceptions of administration, which he himself did not live to carry out, were in the main the principles upon which his nephew Augustus founded the solid fabric of the Roman Empire, the most enduring political institution ever created by man. In the brief intervals between incessant fighting he displayed amazing activity in the work of reform, and was untiring in his efforts on behalf, not only of the poorer classes at Rome, but also of the provincials so long exploited by senatorial nominees.

Caesar's Famous Commentaries

As a man of letters Caesar stands in the highest rank. Unfortunately the only works that have come down to us are his famous commentaries on the Gallic war and on the Civil war, which are models of simple and clear writing. Ancient testimony is unanimous that he was a consummate orator, second only to Cicero. Apart from his morals, which probably were those of the times in which he lived, Caesar's personal character had many great traits. He was straightforward, honest, and a loyal friend, and towards his enemies he behaved with a magnanimity which was centuries in advance of the spirit of his age.

Bibliography. Ancient Britain and the Invasions of Julius Caesar, T. R. E. Holmes, 1907; Caesar's Conquest of Gaul, ed. Holmes, 1911; Annals of Caesar, E. G. Sihler, 1911; Lives, J. Buchan, 1932; G. Ferrers, 1932; César, J. Carcopino, 1936.

For the play by William Shakespeare about this Roman soldier, see Julius Caesar.

Caesar, SIR JULIUS (1558-1636). English judge. He was a son of an Italian doctor, Cesare Adelmare, who was physician to Mary I and Elizabeth I, and whose children adopted the anglicised form of their father's name. Born at Tottenham, and educated at Magdalen Hall, Oxford, he was called to the bar in 1580. He became judge of the Admiralty court in 1584, a knight in 1603, chancellor of the exchequer in 1606, and master of the rolls in 1614. Famous for his bounties, and incorruptible, he died April 18, 1636, and is buried in Great S. Helen's church, Bishopsgate, London.

Caesar and Cleopatra. Pseudo-historical drama by Bernard Shaw, produced Nov. 25, 1907, at the Savoy Theatre, London, having previously been staged at Newcastle (1899) and at Leeds. It consists mainly of a series of discourses on politics, imperialism, and convention which Caesar, in the character of a Fabian superman, delivers to Britannus, a model of British propriety, and to Cleopatra, whom the dramatist represents as a coquettish and cruel minx of sixteen. The play was published in 1901. A film of the play was made by Gabriel Pascal, starring Claude Rains and Vivien Leigh, and shown in 1945.

Caesarea. Ancient name of Kaisari (*q.v.*), a town of Turkey-in-Asia. Formerly Mazaca, the capital of Cappadocia, it was named Caesarea when it became Roman in A.D. 18. Some traces of the old city remain.

Caesarea. Ancient name of a small seaport of Palestine founded by Herod, 13 B.C., on the site of an earlier city. For the Israeli town on the same site. *see* Qisarya.

Caesarea Philippi. Ancient city of Palestine. It stands at the foot of Mt. Hermon, near one source of the Jordan. The ancient Panias (mod. Banias), so called from its worship of Pan, it was re-founded by Philip the Tetrarch, who built here a temple to Caesar Augustus. There are but few remains of the ancient city.

Caesarian Section. Removal of an infant from the body of the mother by opening the abdomen and cutting open the uterus. The term is derived from the tradition that Julius Caesar was thus delivered. The operation is performed in cases where the mother has died but it is believed that the infant is still living, and in certain cases where, owing to disease or obstruction of the natural passages, the operation affords the best hope of

saving the lives of mother and infant. *See* Obstetrics; Surgery.

Caesarion (47-30 B.C.). Supposed son of Julius Caesar by Cleopatra, originally called Ptolemaeus. He was executed by order of Augustus after her death.

Caesar's Camp. Popular name frequently given to earthworks in S. England. These earthworks are almost invariably pre-Roman in origin, and their round or oval plan is very different from the rectangular outline of the typical Roman camp. Coins and other objects show that some of the sites were not at once deserted in the Romano-British period (*e.g.* at Holwood Hill, Kent, and at Aldershot and Crondall, Hampshire). The hill-fort on St. George's Hill, Weybridge, is incorrectly associated with Caesar's passage of the Thames.

Caesium (Lat. *caesius*, bluish grey). Rare metallic element. Its chemical symbol is Cs, atomic number 55, atomic weight, 132.91: boiling point 670° C.; specific gravity at 15° C. (59° F.), 1.87; melting point 28.45° C. or 83.2° F. It was first recognized by Bunsen and Kirchhoff about 1860, when examining the waters of Durkheim, Bavaria, by the aid of the spectroscope, which revealed its presence by certain bluish grey lines. Caesium was the first new element to be discovered by the aid of that instrument, but for many years it remained unisolated as a metal, and appeared only as the oxide. It is silvery white in colour and soft at ordinary temperatures. It is the most electropositive of known metals.

Though extremely rare, caesium is widely distributed. It occurs in association with lithia and rubidium in the mineral lepidolite, and with rubidium in petalite, the former being found in Maine, U.S.A., and the latter in the waste concentrated waters of the Nauheim salt works, Germany; in the ash of seaweed and of the tea, tobacco, and some other plants, and in carnallite, one of the products of the German potash mines. It is also found free from rubidium in the rare mineral pollux, or aluminium sodium silicate, which occurs in the island of Elba, at Yorke, Australia, and at Frankenhäusen, Germany.

Caesium is extracted from its ores by the action of either magnesium or calcium on caesium chloride or carbonate, hydrogen being employed to provide a non-oxidising atmosphere. It is purified by electrolysis of caesium cyanide solutions. It is used in the

production of thermionic valves and photoelectric cells, the caesium cell being many times more sensitive than the hydrogenated potassium cell formerly used.

Caesura (Lat., cutting). Metrical pause or rest in a verse, sometimes combined with a grammatical pause. In heroic verse especially its place can be varied to heighten effect and to avoid monotony of rhythm. Pope placed the caesura at the end of the second foot with such regularity that Hazlitt compared the effect to that of a rocking-horse. Milton varies the situation of the caesura from the end of the first to the end of the fourth foot. In the following passage from *Comus* it occurs at a different point in each line:

But to my task. | Neptune, besides the sway
Of every salt flood | and each ebbing stream,
Took in, | by lot 'twixt high and nether Jove,
Imperial rule of all the sea-girt isles |
That like to rich and various gems | inlay
The unadorned bosom | of the deep.
See Blank Verse.

Café (Fr., coffee). Word used in France also for a place of entertainment where coffee and other refreshments are served. Coffee was brought into fashion by the ambassador of the sultan to Louis XIV in 1669. The first café in France was opened at Marseilles in 1671; it was followed in Paris in 1686 by the famous Café Procope with its elaborate setting of mirrors and chandeliers. Voltaire often sat at its marble tables. Cafés became more or less clubs where people gathered generally to argue, sometimes to conspire. Montesquieu wrote in 1721: "They are dangerous for the future of France because customers get their brains intoxicated with the coffee they drink." At the Café de Foy, Camille Desmoulins proclaimed the Revolution.

The word was introduced into Great Britain late in the 19th century, and came to denote any place of refreshment serving only non-alcoholic beverages.

A 20th-century development, originating like its name in the U.S.A., is the cafeteria, of which the distinguishing feature is that the customer collects and pays for his meal at a service counter. It was introduced into Great Britain in the late 1920s.

Caffeine. Alkaloid prepared from the dried leaves of *Camellia thea* (tea) and certain other plants, or synthetically from theobromine. Caffeine stimulates the muscles of the heart, and increases the rate of the heart-beat, thus forming a useful drug in certain forms of heart-disease; it increases the flow of the urine, acts as a stimu-

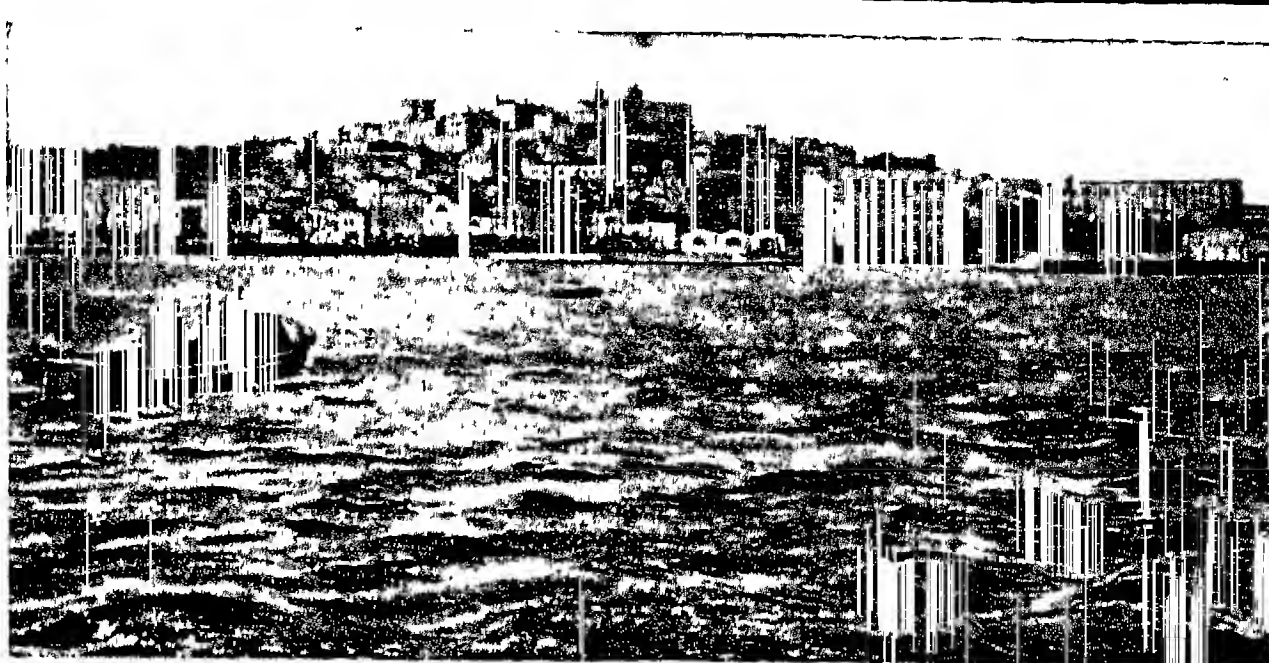
lant to the nervous system, and it was formerly used in treating dropsy. In small doses it increases the power of pain-easing drugs. The dose of caffeine is 1 to 5 grs., of citrate of caffeine 2 to 10 grs., and of effervescing citrate of caffeine 60 to 120 grs.

Cagayán. Province of N. Luzon, Philippine Islands. Well watered and fertile in the plains, and wooded on the mountains, it has an area of 5,052 sq. m., and produces fine tobacco and timber. It contains the Rio Grande de Cagayán. Capital, Tuguegarao.

Cage (Fr., from Lat. *cavea*). Word with various meanings. (1) Commonly a receptacle for the enclosure of birds or animals, constructed with wires or bars to provide open spaces for air and light; (2) as applied to mining, a framework fitted with platforms for receiving miners and trucks during their ascent or descent in mine shafts; (3) a skeleton framework for limiting the movement of a ball valve as, e.g., in the feed pipe of a locomotive boiler; (4) a cup having a glass bottom and cover, between which is a drop of water containing animalcules to be examined under a microscope; (5) old Chinese form of punishment consisting of a wooden cage so constructed that the prisoner must either suspend himself by the neck to relieve his toes, or stand on his toes to relieve his neck; thus situated the victim is left to starve; (6) in both Great Wars, a barbed-wire enclosure in which prisoners-of-war were incarcerated.

Cage Birds. Term used for birds kept in wire cages. The practice is an old one, and has been the subject of much controversy on sentimental grounds. To many minds there is something highly objectionable in depriving of their liberty highly organized creatures fitted by nature for the widest freedom—that of the air—and their captivity under conditions where they cannot even indulge in flight of a few yards appears to be brutal.

As a result of such sentiments, the keeping of British wild birds in cages was forbidden in Great Britain by an act of 1933, and only birds reared in captivity may be caged in that country. Such a species is the canary, for generations bred commercially in captivity, and enjoying great popularity on account of its song. The cage should be as roomy as possible, kept free from parasites, supplied with convenient perches



Cagliari, Sardinia. General view from the harbour. Dominating the town are the castle and the 16th century university buildings

and fresh food and water. It should be hung where it will be free from draughts.

Cagli. City of Italy, in the prov. of Pesaro e Urbino, 18 m. S. of Urbino. An historic place, and the seat of a bishop, it has a citadel and remains of an older city, while near by are numerous relics and ruins of great age. Silk is manufactured. Pop. (1951) 12,564.

Cagliari. Province of Sardinia, Italy. Comprising the S. half of the island, it has an area of 5,179 sq. m., and contains the capital, Cagliari. Pop. (1951) 664,685.

Cagliari (anc. Carales). City of Italy, capital of Sardinia and of Cagliari prov. Finely situated in the middle of the S. coast, it is connected by rly. with the chief towns in the island. The old town lies on a hill 300 ft. high, and the more modern one stretches to the sea, with lagoons on either side. Its cathedral dates from the 13th century and the university was founded in 1626. It has a Phoenico-Roman necropolis, Roman amphitheatre, Punic and Roman tombs, and other ancient remains.

Cagliari is a centre of the mining industry. Its well-protected harbour can accommodate vessels having a draught of 25 ft. It exports wines, salt, lead, and zinc, and is noted for its sweet cakes and gold and silver ornaments. Pop. (1951) 141,573.

Founded by the Phoenicians, Cagliari was a Carthaginian stronghold in the 6th century B.C., and passed to Rome 300 years later. Captured by the Goths, A.D. 455, by the Saracens, 720, and by the Pisans and Genoese in the 11th century, then by Venetians and Aragonese in 1326, in 1640 it was attacked by the Turks, and in 1708 bombarded by the British. During the Second Great War the Italian government developed an important seaplane base here which.

with the harbour and airfield, became a target for Allied bombers from Feb. 3, 1943. In anticipation of a possible, but unrealized, Allied landing, civilians were evacuated from Cagliari in May. When Italy surrendered in Sept., the Allies gained control of the city's facilities. *Pron.* Cal-ye-ar-ee. See Mediterranean; Sardinia.

Cagliari, GULF OF. Wide bay on the S. coast of Sardinia. It is bounded E. by Cape Carbonara and W. by Cape Spartivento, and at its head is the city of Cagliari.

Cagliari, PAOLO. Name of the Italian painter better known as Paul or Paolo Veronese (*q.v.*).

Cagliostro, COUNT ALESSANDRO (1743–95). Italian charlatan, whose real name was Giuseppe Balsamo. Born of poor parents at Palermo, June 2, 1743, he acquired a smattering of chemistry and medicine as assistant to the apothecary of the monastery of Caltagirone. Leaving Sicily in 1769, he gained some knowledge of occultism in Greece, Egypt, Asia, and Malta.

From Rome, where he married the beautiful Lorenza Feliciani, he set out with his wife on a tour through Europe, fleecing fashionable society as an adept in medicine, alchemy, and the cabalistic and necromantic arts, and as a vendor of love philtres and elixirs of youth. In 1785 he became involved in the affair of the Diamond Necklace (*q.v.*) and was imprisoned in the Bastille. After his release he came to London, and, proceeding later to Rome, was condemned to death in 1789 for establishing an Egyptian order of freemasonry. The sentence was commuted to life imprisonment in the fortress of San Leone, where he died Aug. 26, 1795.

Cagney, JAMES (b. 1904). American stage and screen actor. Born in New York July 17, 1904; he attended Columbia university.

He appeared on the stage 1920 and entered films 1930. At first he specialised in "tough" but not unsympathetic characters, early films including *Larceny Lane* and *The Crowd Roars*. His portrayal of Bottom in Reinhardt's film of *A Midsummer Night's Dream*, 1936, was an original conception. His work in *City for Conquest*, 1941, *Yankee Doodle Dandy*, 1943, *Johnny Vagabond*, 1944, and *White Heat*, 1949, was very highly praised.

Cagots. The French name for scattered groups of people inhabiting parts of the Western Pyrenees and Brittany. In the Middle Ages they were confined to separate *cagoteries*, like the Jewish ghettos, and in church they were segregated from the general community. Popular tradition regarded them as heretic descendants of Gothic marauders (5th century), and their fair colouring suggests Teutonic ancestry. They are no longer ostracised, and have long outlived any tendency to the leprosy or cretinism that may once have occasioned their social isolation.

Cagoule, LA (Fr., the hood). French secret political organization. In 1936 when, under the guise of the "popular front," the Communists seemed to be leading France, an engineer belonging to the corps of naval constructors, Eugène Deloncle, decided with some friends to create a secret party, *Le Parti National Révolutionnaire et Social*. Fifteen months later he formed *Le Comité Secret d'Action Révolutionnaire*, called in mockery "la cagoule," as hiding under the hood of secrecy; its members (who were armed) were referred to as *cagouleurs*. Their professed aims were to overthrow parliamentary democracy, create a strong govt., and restore the monarchy. On Sept. 11, 1937, they blew up two houses in Paris. Some were arrested. In the Second Great War they were sent to the front. Deloncle and many others were killed. The trial of the *cagouleurs* ended only on Oct. 27, 1948 with prison sentences.

Caguas. Town of Puerto Rico. It is 22 m. S. by E. of San Juan. Its industries are concerned with tobacco, rum, and sugar-cane; it also makes furniture and is the centre of a dairy-farming district. According to tradition, it was founded by Ponce de Leon c. 1510; it was chartered in 1775 as San Sebastian, was renamed after an Indian chief, and became a city in 1894. Pop. (1950) 33,759.

Caha. Mountain range of Ireland, extending along the borders of cos. Cork and Kerry, and between the estuary of Kenmare river and Bantry Bay for about 11 m. in a N.E. to S.W. direction. It encloses a large number of small lakes; Hungry Hill, 2,251 ft., is the culminating height.

Cahir (stone fort). Parish and market town of co. Tipperary, province of Munster, Irish Republic. It stands on the Suir, 10 m. W. of Clonmel. It has flour mills, and a large trade in corn and agricultural produce. Cahir Castle, on a rock in the Suir, was founded in the early 12th century. Market day, Fri. Pop. (1951) 3,972.

Cahn, SIR JULIEN (d. 1944). British sportsman. As a young man he made a fortune in S. African mining ventures. He became well known in England, not only on account of his great wealth, but as a cricket enthusiast. He captained cricket teams which toured Jamaica, 1929, Argentina, 1930, Denmark and Jutland, 1932, Canada, the U.S.A., and Bermuda, 1933, Ceylon and Singapore, 1937, New Zealand, 1939. He died Sept. 26, 1944.

Cahors. City of France, the capital of the department of Lot. It stands on a peninsula formed by the river Lot, 70 m. N. of Toulouse, on the rly. to Limoges. The cathedral, in the Romanesque-Byzantine style, was begun in the 11th century. Other buildings are the church of S. Ursice, remains of the palace of Pope John XXII, a native of Cahors, and the Barbacane of the 15th century.

There are an old town and a new town divided by a boulevard, and the suburbs of St. Georges and Cabessut, connected with the city proper by three bridges. The old town has picturesque old houses and narrow streets; in the new town are squares and spacious

roadways. There is a public library, and the château, or logis, du Roi is now used as a prison. Industries include tanning and the making of paper, woollen goods, and agricultural implements. Pop. (1954) 15,380.

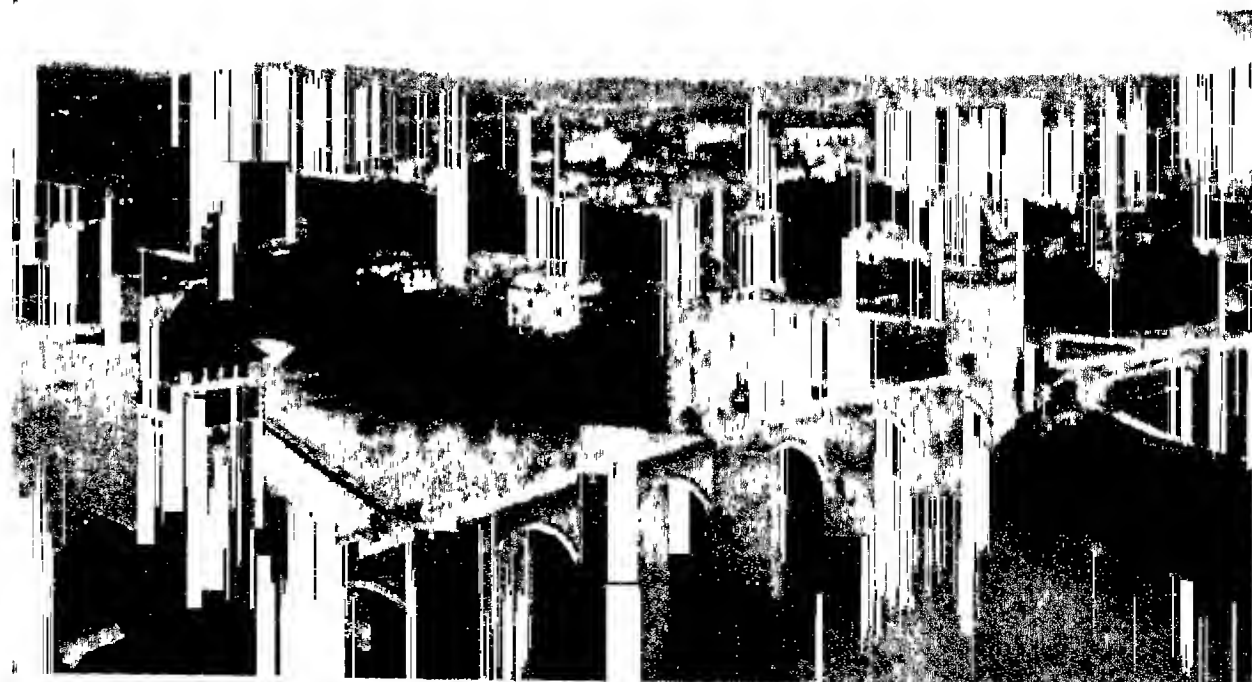
Cahors existed in Roman times as the capital of the Cadureci (*q.v.*) and part of the town is still known as Les Cadureas. It was made a bishopric in the 3rd century. In the Middle Ages it was the capital of Quercy (corruption of Cadureci), a banking centre occupied by Lombard bankers, and a flourishing market for wine. Its university, founded by Pope John XVII, was amalgamated with that of Toulouse in 1751. Henry IV, to whom the town had offered resistance, took away from the citizens their right to hold a wine market, and its prosperity declined. Léon Gambetta was born here.

Cahuecite. Blasting explosive of the gunpowder type invented about 1875 by R. Cahue. It was manufactured at Dartford, Kent, and placed on the market under the names of carboazotine and safety blasting powder. It is marketed in the form of cartridges. See Explosives; Gunpowder.

Caiaphas, JOSEPH. Jewish high priest. The son-in-law of Annas, he was high priest at Jerusalem during the year of the trial of Jesus. Belonging to the priestly order of the Sadducees, he figures thrice in the N.T.: after the raising of Lazarus (John 11); at the trial and condemnation of Jesus (Matt. 26); and in the examination of Peter and John (Acts 4). Tradition says he became a Christian.

Caibarien. Town and harbour of N. Cuba, in Santa Clara prov. It exports sugar and sponges.

Caicos and Turks Islands. Small group of the Bahamas. Situated about 100 m. N. of Haiti,



Cahors, France. The Pont Valentré over the river Lot, the finest fortified medieval bridge in France, dating from the early 14th century

they form a dependency of Jamaica. The Caicos, which lie to the N. of Turks Islands, comprise N., S., E., W., and Middle Caicos with smaller islands, of which eight are inhabited. The seat of government is at Grand Turk. The chief exports are sponges, salt, and sisal. Discovered by the Spaniard, Ponce de Leon, 1512, they were annexed to Jamaica, 1873. Area 202 sq. m. Pop. (est.) 6,500.

Caillaux, JOSEPH PIERRE MARIE AUGUSTE (1863-1944).

French politician. Born at Le Mans and trained as a lawyer, he entered the government service and was made inspector of finances in 1888. Ten years later he was elected deputy for Sarthe, retaining the seat until 1919. Minister of finance in four ministries, 1899-1902, 1906-08, 1911, and 1913-14, he was prime minister in 1911-12. He resigned in March, 1914, after publication of damaging letters he had written ended in the shooting of the editor, Calmette, by Mme. Caillaux. (She was subsequently acquitted of murder.)

At the beginning of the First Great War Caillaux was appointed paymaster to the army; and in 1915 he was sent on a mission to S. America. In 1917 the government decided to bring him to trial on the charge of having worked against the security of the state during the war by dealing with the enemy. After more than two years in prison, he was tried before the senate in 1920, and was acquitted of treason, but found guilty of holding relations with the enemy, and was sentenced to three years' imprisonment and loss of civil rights for ten years. He was at once released, as he had already served most of his term of imprisonment; his civil rights were restored in 1924. He was minister of finance in 1925-26 and for a few days in 1935. President of the finance committee of the senate, 1932, he was chairman from 1935 until the defeat of France by the Germans in 1940. He died Nov. 21, 1944.



Cain. Lord Leighton's drawing of Cain and Abel, remarkable for the dramatic movement of the figure

Cailletet, LOUIS PAUL (1832-1913). French scientist. Born at Châtillon-sur-Seine, Sept. 21, 1832, he became head of his father's ironworks, but is chiefly famous for his work on the liquefaction of gases. He liquefied oxygen in 1877 and later hydrogen, nitrogen, and air. He died Jan. 5, 1913.

Caiman OR CAYMAN. Group of alligators found in Central and S. America. Of the five known species the commonest is the



Caiman. Rough-eyed caiman of South America

black caiman, which is about 14 ft. long; the other species being considerably smaller. They differ from other alligators only in minor details. They abound in the Amazon and Orinoco rivers.

Cain. First-born son of Adam and Eve (Gen. 4; Heb. 11; 1 John 3). According to the book of Genesis, he killed his brother Abel in a fit of jealousy, was banished as a fugitive and wanderer, and founded the first city, which he called Enoch after his son. A Jewish tradition states that he was accidentally killed by his descendant Lamech.

the father of Jubal and Tubal-cain. Cain is the name of a city of Hebron (Josh. 15).

Caine, SIR (THOMAS HENRY) HALL (1853-1931). British novelist. Born at Runcorn, Cheshire, May 14, 1853, he was educated at Liverpool elementary school, and spent part of his early boyhood in the Isle of Man, of which his father was a native. At 14 he became clerk to a Liverpool architect; then, although he found himself interested in literature, until 1881 he worked for a builder. In 1879 he gave a lecture in Liverpool on D. G. Rossetti, which led to a correspondence with that author, and, in 1881, to a secretarial post with him for a few months.

Caine worked in London for several years on miscellaneous journalism for the Liverpool Mercury, published his first novel, *The Shadow of a Crime*, in 1885, and followed this with (among others) *The Deemster*, 1887, *The Manxman*, 1894, *The Prodigal Son*, 1904, and *The Woman Thou Gavest Me*, 1913, all set in a Manx background. He went to live in the island, which he made his special literary province, making his fortune, and sitting in the House of Keys for some time.

Ranking only as a popular novelist, Caine appealed to a wide public by his robust morality and his blend of religiosity and sentiment. Created K.B.E. in 1918, he died at Greeba Castle, I.O.M., Aug. 31, 1931.

Ca'ing Whale OR PILOT WHALE (*Globicephalus melas*). Species of toothed whale found in most temperate seas, and occasionally seen off the N. coast of Scotland; in Australia it is called the blackfish. It



Ca'ing whales left stranded on the shore by an outgoing tide: a fate that often overtakes them



Hall Caine
Russell

is 20 ft. long, and black except for a lighter area on the chest, and has a rounded head with 8 to 12 teeth in each jaw. It feeds mainly on cephalopods, and is mild and inoffensive. Ca'ing whales are gregarious, and if one is driven ashore the whole school will follow the leader—hence the name pilot. Oil is obtained from the blubber, and their flesh is edible.

Cainites. Obscure Gnostic sect of the 2nd century. They are said to have adopted Cain, Corah, Dathan, and the inhabitants of Sodom as objects of veneration. See Gnosticism.

Cainozoic (Gr. *kainos*, new; *zoē*, life). Name applied by geologists to the era in which the Tertiary rocks were deposited, in contradistinction to Palaeozoic and Mesozoic. See Geology; Rocks.

Ça ira. Popular song of the French Revolution (1789). It took its name from the refrain, *Ça ira*.

Ah! ça ira, ça ira, ça ira!
Les aristocrat' à la lanterne!
Ah! ça ira, ça ira, ça ira!
Les aristocrat' on les pendra!

of which an equivalent English rendering is:

That's the trick, that's the trick!
String the toffs up high!
Swing 'em to a lamp post!
There let 'em die!

It was called the Carillon National and, together with the Carmagnole, became the battle chorus of the advanced revolutionary party. The words were by Ladré, a street singer, and the air by Bécour, an equally undistinguished musician.

Under the Directory the song was prohibited in 1797.

Caird, EDWARD (1835-1908). British philosopher. Brother of John Caird (1820-98), principal of Glasgow university, he was born at Greenock, Renfrewshire, March 22, 1835. Educated at Glasgow university, St. Andrews, and Balliol College, Oxford, he became fellow of



Edward Caird,
British philosopher
Elliott & Fry

Merton, 1864, and professor of moral philosophy at Glasgow, 1866. In 1893 he was made master of Balliol as successor to Jowett. In 1907 he resigned the mastership, and died at Oxford Nov. 1, 1908.

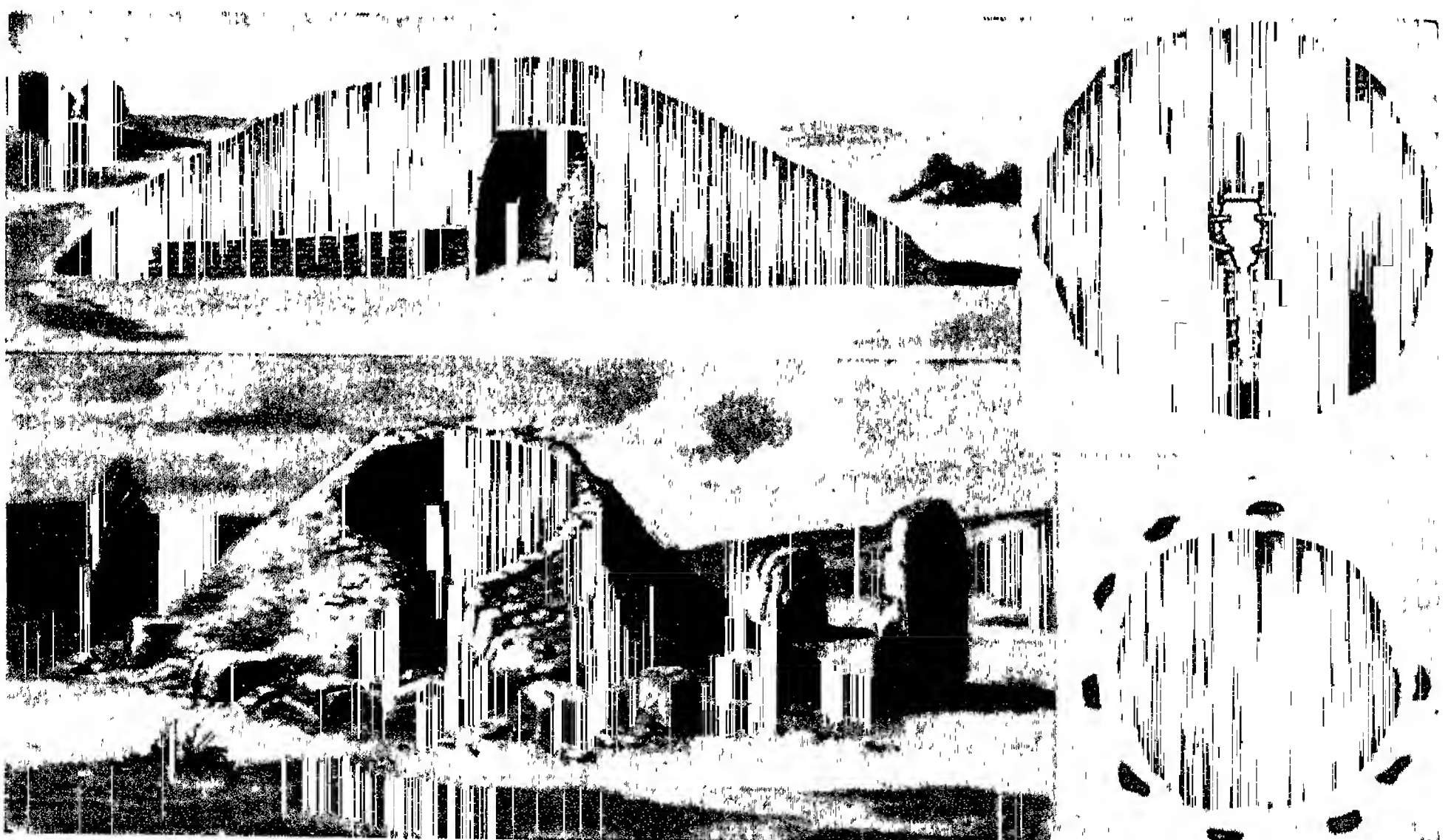
A pronounced Hegelian, he was a critical idealist, who endeavoured to find in Kant the origin of the ideas later developed by Hegel. Religion is the consciousness of a unity that overcomes the opposition between subject and object; the infinite is the divine spirit that stands above everything finite. His most important works are *The Social Philosophy and Religion of Comte*, 1885; *The Critical Philosophy of Immanuel Kant*, 1889; and *The Evolution of Religion*, 1893.

Cairn (Celt. *carn*, heap). Pile or mound of stones. The purpose may be memorial, as the witness-cairn

of Jacob's compact with Laban (Gen. 31), or the prince's cairn on Lochnagar, Scotland. It may be ritual, as when every passer-by conventionally adds a stone; cf. the Gaelic saying, I will add a stone to your cairn. It may be derisory, recording an act of baseness, a boundary mark, or a guide mark.

In archaeology the word denotes a sepulchral mound of unmortared stones, as distinct from an earthen barrow. Cairns of many periods are found all over the world. Absalom was buried beneath a mound of stones (2 Sam.). In Europe cairns are specially associated with the Megalithic (*q.v.*) culture. They were built where stone was plentiful to cover elaborate burial chambers usually designed to serve as family or group tombs, the tomb being the essential structure.

The largest burial cairn in N.W. Europe is New Grange, on the Boyne, in Ireland, 45 ft. high, of loose stones once covered with an outer layer of shining white quartz. It is surrounded by a ditch and a circle of free-standing stones, and within is a passage 60 ft. long leading to a corbelled chamber 17 ft. high. Other notable examples are the round cairn of Bryn Celli Ddu in Anglesey, Maeshowe in Orkney, Camster in Caithness. Some cairns have projecting horns at one end to enclose a forecourt, e.g. Cashtal yn Ard (horned cairn) in the Isle of Man. The entrances of all were carefully blocked with stones



Cairn. Lower picture: the Clava cairn and, right, plan of the Corriemoney circular cairn, both in Inverness-shire. The Corriemoney cairn is about 60 feet in diameter and 11 feet in height. Upper picture: section and plan of the cairn at Camster, Caithness, showing passage 20 feet long and chamber 10 feet high

which had to be removed when a burial took place.

Cairnes, JOHN ELLIOT (1823-75). British economist. Born at Castle Bellingham, co. Louth, Dec. 26, 1823, he was educated at Trinity College, Dublin. He was appointed professor of political economy at Dublin in 1856; at Queen's College, Galway, in 1859; and at University College, London, in 1866, resigning through ill-health in 1872. He died July 8, 1875.

An intimate friend of John Stuart Mill, Cairnes was after Mill's death the leading economist in the Ricardian tradition. He made important contributions to the study of the effect on prices of the discovery of gold in Australia and in California, and had considerable influence on educated opinion in the U.K. concerning the American Civil War (he favoured the abolitionists). His publications included *The Logical Method of Political Economy*, 1857, and *Leading Principles of Political Economy*, 1874.

Cairngorm. Group of mts. of Scotland, made a nature reserve in 1954. They lie across the borders of Inverness-shire, Aberdeenshire, and Banffshire. They are part of the Grampians, and include six peaks over 4,000 ft. Cairngorm itself, 12 m. N.W. of Braemar, alt. 4,084 ft., generally snowcapped, produces topazes and Cairngorm stones, a variety of quartz. Yellow brown to dark brown and very nearly opaque, cairngorms intended for use in jewelry are boiled in oil to make them less opaque. They are also found in Switzerland and Colorado, U.S.A.

Cairns. Seaport and rly. terminus of Queensland, Australia, 890 m. N.W. of Brisbane. On Trinity Bay, it has a good harbour. The surrounding area, which has a high rainfall (70 ins.-150 ins. a year) produces sugar, maize, tobacco, peanuts, cattle, pigs, timber, coal, tin, copper, gold, silver, and wolfram. Major industries of Cairns are butter making, meat canning, brewing, sawmilling, and the making of plywood and rly. rolling stock. Cairns is the chief experimental station of the bureau of sugar, and the h.q. of the Cairns regional electricity board, receiving its power from the Barron Falls, and the Tully Falls works. The town has an equable climate and is popular as a winter tourist resort. Pop. (1954) 21,021.

Cairns, HUGH MACCALMONT CAIRNS, 1ST EARL (1819-85). British lawyer and politician. Born

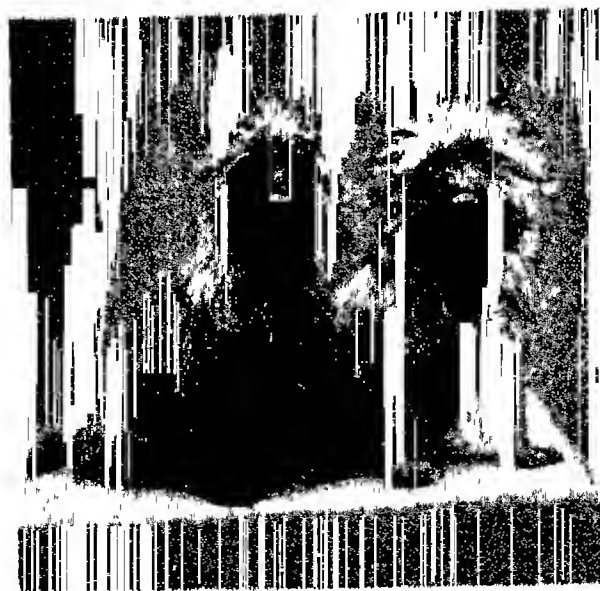
in co. Down, of Protestant stock, he was educated at Belfast and Trinity College, Dublin. He was called to the English bar in 1844 and was Conservative M.P. for Belfast 1852-66. He was solicitor-general in 1858, attorney-general in 1866. Created Baron Cairns and a lord justice of appeal in 1867, he was lord chancellor in Disraeli's ministry in 1868, and again 1874-80. He was created Earl Cairns in 1878 and died at Bournemouth, April 2, 1885. He was responsible together with Lord Selborne for legislation simplifying the transfer of land.

Cairns, SIR HUGH WILLIAM BELL (1896-1952). British surgeon. Born in S. Australia, June 26, 1896, he was educated at Adelaide University and Balliol College, Oxford. During the First Great War he served in the Australian Army Medical Corps. Hunterian professor, Royal College of Surgeons, in 1925, Cairns was honorary surgeon to the National Hospital for Diseases of the Nervous System 1934-37. He was consultant adviser on head injuries to the ministry of Health in 1939 and consulting neurosurgeon to the army in Great Britain during 1939-45. Knighted 1946, he died July 18, 1952.

Cairn Terrier. Dog, originally a small working terrier common in the Highlands, established as a



1st Earl Cairns,
British lawyer



Cairn Terrier. Two specimens of the small, companionable Scottish dog popular everywhere in Gt. Britain

definite breed in 1908, under the name short-haired Skye. The terrier gained support quickly, and was officially named Cairn terrier in 1910. They are game, hardy, and active, with unimpaired sporting instincts. The ideal weight is 14 lb. The expression is foxy and intelli-

gent, the ears are erect; the coat, profuse and hard, is red, sandy, grey, brindled, or nearly black in colour, with dark points on ears and muzzle. The undercoat is soft.

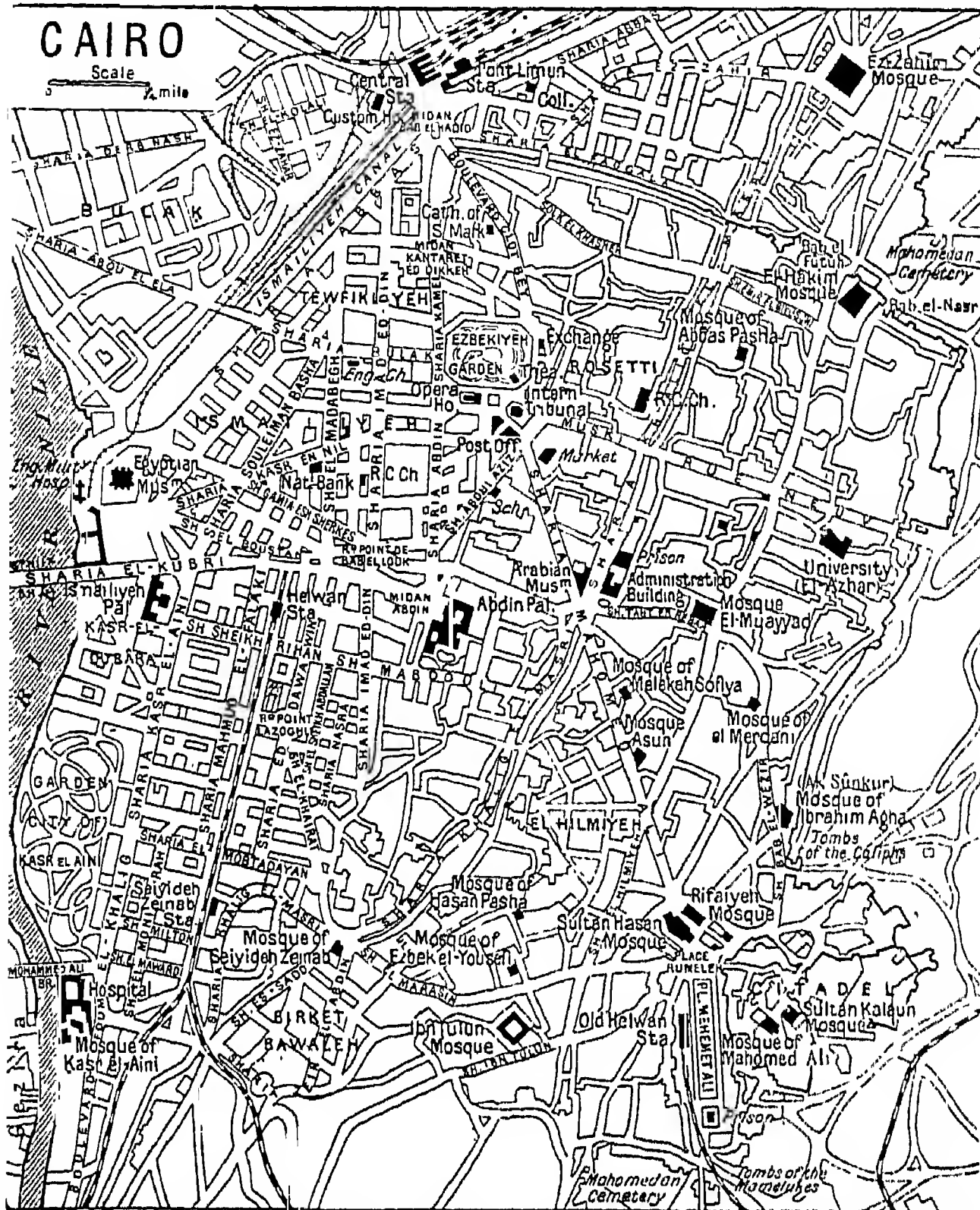
Cairntoul. Peak of the Cairngorm group of the Grampian Mts., Scotland. Its height is 4,240 ft.

Cairo OR MISR. Capital of Egypt. The largest urban centre in Africa, it is situated on the right bank of the Nile. Founded about the year 1000 by Gohar, a general of the Fatimide dynasty, the city of El-Kâhira (the victorious) is on the site of four earlier cities built between the 7th and the 10th centuries, which themselves covered the ancient Roman fortress of Babylon, conquered by the Caliph Omar in A.D. 639, the great gate of which still remains.

In the Middle Ages Cairo was the residence of the caliphs and the chief centre of Saracenic art. More than 250 mosques attest the splendour of the medieval city. The building which houses the University of El-Azhar, originally a mosque, dates from about the end of the 10th century, and, though much of it has been rebuilt, contains many examples of Arabic art. The most ancient Mahomedan building is the mosque of Amru, situated in Old Cairo, some distance from the present city. The most beautiful mosques are those of El-Hâkim, begun about A.D. 990; Kalaun, 1288; Ak-Sûnkur, 1347, which is completely covered with blue and green porcelain tiles; Sultan Hasan, 1358, and El-Muayyad, 1412.

The medieval city was divided into quarters—Christian, Coptic, Jewish, and Frankish—shut off from each other by gates. Modern Cairo is virtually one city, although there are localities peopled mainly by one sect. In the centre the chief hotels and shops are to be found.

Few of the palaces of the Mamelukes are standing, but many of the lesser houses retain the characteristic features of Saracenic art. A commission for the conservation of Arab art endeavours to prevent the ruthless destruction of old buildings. Buildings of interest other than mosques include the citadel, built by Saladin in 1166 from stones brought from the small pyramids at Gizeh: the gates called Bâb-el-Nasr and Bâb-el-Futûh; the Coptic churches, including the cathedral dedicated to S. Mark; the Arabian Museum; the Egyptian Library; and the Tombs of the Caliphs (so-called), some distance from the city.



Cairo. Plan of the city, showing the modern European districts in the Ismailiyeh quarter. The principal mosques and bazaars are on the right of the map

Cairo enjoys a fairly healthy climate, with a mean temperature in summer of 83° F. and in winter of 59°. It is well served by railway and has a good water supply, and is the most convenient starting point for a visit to the Pyramids, which lie a few miles to the S.W. Pop. (1947) 2,090,654.

During the 20th century the city was extended in nearly all directions, to the suburbs of Gezira Island and Heliopolis on the N. and Helouan on the S. The principal modern edifices are the government buildings, the splendid museum of Egyptian antiquities opened in 1902, the courts (built for the international tribunals set up in 1937 and abolished in 1949), the exchange, the ministerial offices connected with war and with public works, the American and other embassies, the palace of Khedive Ismail on the Nile, and the Abdin palace. There are three sporting clubs and two racecourses. It is the emporium for merchandise coming from Asiatic Turkey, Persia, India, Upper Egypt, and the Sudan, by way of the Nile and the rlys.

European and American products are in demand. Native bazaars retail textiles, metal ware, perfumes, and leather goods. There are two airports.

Besides the Islamic university of El-Azhar, Cairo has two other universities devoted to general studies: Cairo University, founded 1908, and Ibrahim University, founded 1950. It is the seat of R.C., Greek Orthodox, and Coptic bishoprics.

Cairo came into prominence during the First Great War as the administrative h.q. of the Allied Egyptian and Palestine campaigns. Well outside the war zone, it suffered only one hostile air raid, Nov., 1916, and was a great centre for British troops and an important base for the Red Cross.

During the Second Great War the h.q. of Great Britain's Middle East Command was Cairo, which became a centre for troops on leave. Two air raids, one in 1940 and one in 1941, caused only slight damage. On Feb. 2, 1943, Winston Churchill held a conference in Cairo with the Egyptian premier (Nahas Pasha), Lord

Moyné, and the British services chiefs. During Nov. 22-26 there was a further conference between President Franklin D. Roosevelt, Churchill, and Generalissimo Chiang Kai-shek to discuss military operations against Japan. This was followed on Dec. 4-6 by a meeting between Roosevelt, Churchill, and Ismet İnönü, president of the Turkish republic. The Arab League (*q.v.*) was formed here in 1944. The British decision, announced in May, 1946, to withdraw all armed forces from Egypt was put into effect so far as Cairo was concerned during July 4, 1946-March 28, 1947, when the last British troops left after more than 60 years.

Cairo. City and river port of Illinois, U.S.A., the co. seat of Alexander co. It stands at the confluence of the Mississippi and the Ohio, 125 m. S.E. of St. Louis, and is served by the Illinois Central and other rlys. It has a federal building, a custom house, and a public library, and ships grain and oil. It is the original of Dickens's New Eden in Martin Chuzzlewit. Settled in 1837, it became a city in 1857. Pop. (1950) 12,123.

Cairolì, BENEDETTO (1825-89). Italian soldier and politician. Born at Pavia Jan. 28, 1825, and educated at the University of Pavia, he was a volunteer in the risings against Austria in 1848 and 1859. He served at Palermo, in the Trentino, and at Mutino, but supported the monarchy on the unification of Italy. He became leader of the Left in the chamber, and was prime minister March-Dec., 1878, and 1879-81. He died near Naples, Aug. 8, 1889.

Caisson (Fr. *caisse*, a chest). Chamber of wood, concrete, or metal with watertight walls, used in construction under water or in excavation through water-bearing ground. Where a subaqueous foundation is required at or above sea- or river-bed level, a box caisson having a watertight floor may be towed to the site and sunk down to a prepared bed. At Arromanches in June, 1944, lines of reinforced concrete box caissons were sunk to form breakwaters. (See Mulberry.)

If the foundation is to be below ground or sea-bed level the caisson is made open at the bottom and the base of the walls is fitted with a steel cutting edge. The caisson is made to sink by excavating within the walls and adding weight to the caisson. The walls are built up at the top to keep them above ground



1. General view of the city, showing the mosque of Sultan Hasan. 2. Minarets of the mosque of El-Azhar. 3. Bâb-el-Nasr, "Gate of Victory." 4. Gezireh palace, built by Ismail Pasha. 5. Tombs of the Caliphs. 6. Central Railway Station. 7. The Citadel, built by Saladin in 1166. 8. Street in the old native quarter of the city

CAIRO: MOSQUES AND PALACES OF THE CAPITAL OF MODERN EGYPT

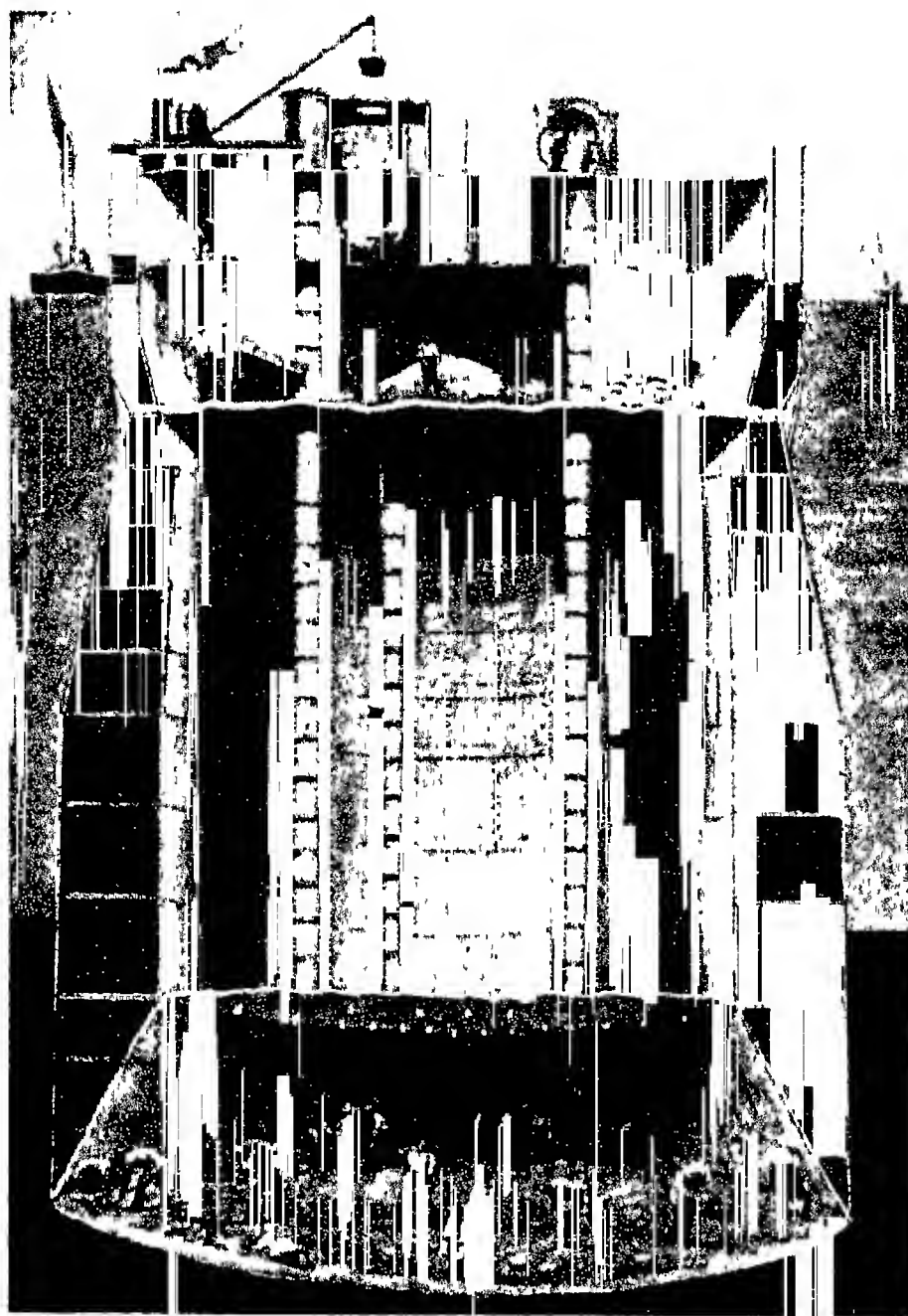
or water level. In watertight ground the excavation may be carried out by hand in the dry. In water-bearing ground the excavation may be done by a mechanical grab passing through the water which will have entered the caisson, or by divers. Excavation in water-bearing ground may be carried out in the dry by excluding the water by compressed air. On completion of the sinking the working chamber is filled with concrete, forming the foundation. Concreting may continue over the whole area of the caisson.

Shafts for access to tunnels or mines may be constructed in a similar way, the caisson walls forming the shaft lining.

The term caisson is also used for a vessel of variable draft adapted to close a dock entrance in place of gates. In a military sense, it means (1) a chest containing explosives which is put in the ground and automatically explodes (*see Mine*); or (2) a heavy armoured wagon for shells accompanying a field gun.

Caisson Disease. Known also as compressed air disease, diver's paralysis, or bends, this occurs in those, *e.g.* divers or men in caissons, who work in high atmospheric pressures. While exposed to the high pressure the blood and the tissues become supersaturated with nitrogen. Nitrogen being particularly soluble in fat, the subcutaneous fatty tissues and fatty sheaths of the nerve fibres in the brain and spinal cord are chiefly affected. If the worker returns suddenly to a normal atmosphere, the nitrogen may come out of solution as bubbles of gas and cause injury and death to the surrounding tissues. Large amounts of gas have been found in the chambers of the heart.

The liability of the tissues to become supersaturated with nitrogen is proportionate to the pressure to which they are exposed and



Caisson. Sectional diagram of a caisson used in the construction of the Forth Bridge. Working under compressed air, men dug through the mud until they reached the solid rock on the bed of the estuary

to the length of the exposure. Thus in pressures below 18 lb. per sq. in. the condition does not obtain; at 30 to 35 lb. per sq. in., shifts must not be longer than 8 hrs.; at 50 lb. per sq. in. not longer than 1 hr. The fat are more susceptible than the thin, and should never be employed on work which involves high atmospheric pressure.

Caithness. Most N.E. maritime county of the Scottish mainland. Bounded N. by Pentland Firth and E. by the North Sea, it is triangular in shape, and has about 75 m. of generally bold and rugged coast, and an area of 685.7 sq. m. Duncansby Head, to the W. of which is the site of John o' Groat's House, and Dunnet Head are the most prominent land projections. The Thurso is the chief river. Caithness, once part of the kingdom of Norway, has many prehistoric and early Norse remains.

Caithness does not rank as a Highland co. Mountainous on the Sutherland border, Morven, 2,313 ft., being the highest summit, the surface is mainly undulating,

and although agriculture thrives, less than 25 p.c. of the soil is under cultivation. The climate is cold and wet, making crops late in ripening. Its fisheries are among the most important in Scotland, the yield of herrings for export being considerable. Sheep and cattle are reared, wool is manufactured, and the quarrying of flagstones was formerly one of the leading industries of the county. Inland communication is by road and rly. Wick is the county town, other towns being Thurso, Castletown, and Lybster. Caithness and Sutherland form a co. constituency. Pop. (1951) 22,705.

Caithness, EARL OF. Scottish title borne since 1455 by the family of Sinclair. In 1379 Sir Henry Sinclair was recognized as earl of Orkney by the king of Norway, and his grandson, William, the 3rd earl, lord chancellor of Scotland, was made earl of Caithness in 1455. William, 2nd earl of Caithness, was killed in battle at Flodden in 1513. John, the 3rd earl, met a similar end in trying to regain the Orkneys.

About 1670 George, the 6th earl, being heavily in debt, pledged his earldom and estates to Sir John Campbell, afterwards earl of Breadalbane, who in 1677 was made earl of Caithness; but in 1681 the title was recovered by a Sinclair. James, the 12th earl (d. 1823), was postmaster-general for Scotland, and James, the 14th, was made a baron of the U.K. in 1866. Norman, the 18th earl, took the name of Buchan in 1911. Dying in 1947, he was succeeded by his nephew, James Sinclair (b. 1906).

Caithness Flags. Middle division of the Old Red Sandstone of N. Scotland. It is well developed in Caithness, and consists of dark grey bituminous and calcareous flagstones, formerly quarried for paving purposes, and famous for the number and perfect preservation of fossil fish remains. The flags attain a thickness of over 11,000 ft. *See Fossil; Rock.*

Caius OR KAYES, JOHN (1510-73). English physician. Born at Norwich Oct. 6, 1510, he was edu-



John Caius, English physician

cated at Gonville Hall, Cambridge, and took his degree of M.D. in 1541 at Padua, Italy, where he was Greek lecturer and reader in physic. On his return he was

appointed anatomical lecturer to the London company of surgeons, and afterwards physician to Edward VI, Mary I, and Elizabeth I. Caius obtained permission, 1557, to refound Gonville Hall as the college of Gonville and Caius (*q.v.*), usually called Caius, to which he left his estate. He wrote a History of the University of Cambridge, 1568, and medical and critical works. A devout R.C., he died July 29, 1573. *Pron.* keys.

Cajamarca. A department of Peru. It lies between the Western Cordillera and the Marañon and is rich in minerals, among them gold, silver, and copper. Cattle-rearing is important. The Marañon is the chief river of the dept. Area 12,540 sq. m. Pop. (est.) 677,000.

Cajamarca. A town of Peru. The capital of the dept. of Cajamarca, it is 90 m. by rly. N.E. of Pacasmayo on the Pacific. On the E. slope of the Cordillera, at an alt. of 9,350 ft., it is an important trading and mining centre, with cotton and woollen, hat, and leather manufactures. The remains of the palace of Atahualpa (*q.v.*), an Inca sovereign, stand on a hill 260 ft. high. There is a fine

cathedral. Near by are the Baños del Inca hot springs, where Atahualpa was executed, 1533. Pop. (est.) 16,000.

Cajeput-tree (*Melaleuca leucodendron*). Evergreen tree of the family Myrtaceae. A native of the Malay region, it has alternate lance-shaped leaves and white flowers produced in spikes. From its leaves is distilled cajeput oil, blue-green in colour and with a strong, agreeable, camphor-like odour and an aromatic taste. It was formerly much used in medicine as a general stimulant, anti-spasmodic, and diaphoretic, and, externally, to relieve the pains of gout and rheumatism. The tree annually sheds its bark, which is used for making canoes, shields, and the roofing of huts.

Cajetan, GIACOMO (1469–1534). Italian theologian and philosopher. Giacomo de Vio was born Feb. 20, 1469, at Gacta, and hence called Cajetan. He entered the Dominican order at the age of fifteen, studied at Naples, Ferrara, and

Padua, and held the chairs of philosophy and theology at Rome, Pavia, and Brescia. In 1508 he was elected general of his order, and nine years later was made a cardinal and sent as apostolic legate to Germany, to reconcile

Luther to Rome and create a league against the Turks. On his return to Rome he became one of the chief counsellors of Pope Clement VII. Cajetan's literary works include translations of and commentaries on a large part of the Bible, a commentary on the Summa Theologica of S. Thomas Aquinas,

and commentaries on portions of Aristotle. He died at Rome, Aug. 9, 1534.

Calabar. Province of Nigeria, West Africa, on the Bight of Biafra. Low-lying along the coast, with mangrove swamps intersected by many waterways and creeks, inland it is mainly a country of oil palm bush and rain forest. It is drained by the r. Cross. Rainfall is heaviest May–Oct., mean annual temp. is 75–80° F. Rubber is cultivated, and there are oil palm plantations with extraction mills. Cocoa, first introduced into Nigeria in Calabar, is important. There are good roads in the W., but transport is chiefly by water. The Ibibio people, notable wood carvers, live in the prov. Area 6,245 sq. m. Pop. (est.) 1,541,000.

Calabar town, h.q. of the prov., is a port on the left bank of the r. Calabar some 5 m. above its junction with the Cross estuary; a British consul for the Bights of Benin and Biafra was appointed at Calabar in 1884. Pop. (est.) 47,000.

Calabar Bean. Seed of *Physostigma venenosum*, a tree of the family Leguminosae occurring in tropical Africa. The bean is kidney-shaped, about 1½ inches in length, and contains a poisonous alkaloid, physostigmine or eserine, the sulphate of which is used in glaucoma and other diseases of the eye. It is also used in the treatment of tetanus or lockjaw.

Calabash Nutmeg (*Monodora myristica*). Small tree of the family Anonaceae, native to tropical Africa. It was introduced by Negroes to the island of Jamaica, whence it was first made known to Europe. It bears large, solitary, sweet-scented flowers, succeeded by globular fruits the size of an



Cajeput-tree. Leaves and flowers of this evergreen



Caithness. The most northerly county of Great Britain, noted for its herring and cod fisheries. John o' Groat's house is near its extreme N.E. point

orange, with hard rind like that of a calabash. The fruit contains a number of seeds, not unlike nutmegs, embedded in pulp. These seeds possess an aromatic oil, with the true nutmeg taste and odour, and are variously called American nutmegs, Jamaica nutmegs, and calabash nutmegs.

Calabash-tree (*Crescentia cujete*). Evergreen tree of the family Bignoniaceae, native to tropical America. It has bell-shaped, tubular flowers variegated in colour—green, purple, red, and yellow. The fruits are globular or slightly oval, with a hard shell-like rind, containing many large, almond-shaped seeds embedded in a sub-acid pulp. The pulp is used as a purgative and, after roasting, as a poultice. The shells (calabashes) serve the people among whom they grow as water bottles, cups, pails, and basins, and are often carved and polished.

Calabria. Southernmost and poorest region of Italy. A peninsula stretching from Lucania to Sicily, it is traversed by the Apennines. Its rivers, all short, have fairly fertile valleys, its coasts are low and malarious. It is divided into the provinces of Catanzaro, Cosenza, and Reggio di Calabria; their respective capitals, similarly named, are the only large towns. Cereals, cotton, sugar, saffron, liquorice, tobacco, olive oil, wine, figs, mulberries, and other fruits are produced. Iron, lead, graphite, and marble are worked; but the main occupations are cattle raising, timber felling, and fishing. Communications, except along the coast, are poor. Soil erosion and deforestation over centuries have contributed to the decrease of production. Many of the inhabitants, who, especially in the interior, are backward, retain their old costumes. There are several colonies of Albanians founded in the 15th century; these preserve their old



Calabria. Southernmost region, or "toe," of Italy

speech, costume, and religion. The brigands of Calabria used to be, even as late as the first quarter of the 20th century, notorious.

After the Second Great War a long-term plan was inaugurated with the aim of raising the standard of living by parcelling out the big estates and promoting industrialisation. Area, 5,810 sq. m. Pop. (1951), 1,974,229.

In ancient times the name Calabria was given to the "heel" of Italy, and the area now called by that name (the "toe") was the ancient Brutium and Lucania, which were colonised by the Greeks in the 8th and 7th centuries B.C. In

British and Canadian troops of the 8th army landing from Sicily between Reggio and San Giovanni on Sept. 3, 1943. German forces had evacuated the peninsula three days earlier.

Caladium. Genus of deciduous perennial plants of the family Araceae, native to South America. There are some 15 species, and numerous cultivated varieties.



Height ranges from 9 ins. to 1½ ft. The leaves are arrow-head in shape. The flower formation is similar to that of the common British arum: small, simple flowers on a spadix protected by a spathe. These plants are grown in the U.K. in a heated glasshouse, for their very ornamental foliage.

Calah. Form used in the English Bible of the name of the Assyrian city Kalkhu or Kalakh, the site of which, traditionally called Nimrud lies on the left bank of the Tigris, 19 m. S. of Ninevah. It was a



Calabria. Peasants in their picturesque costume. Above, typical Calabrian men, notable for their olive skin, and black eyes and hair



Calais. Old town hall near the port, after the German garrison's surrender on Oct. 1, 1944

royal city from at least the time of Shalmaneser I (c. 1300 B.C.) and retained its importance after the rise of Nineveh (*q.v.*), in Sargonid times being a garrison city, the army h.q. It suffered damage in insurrections and civil wars, and was destroyed by the combined Median and Babylonian army in 612 B.C.

The city walls have a circuit of more than 7 m.; in the S.W. corner is the citadel, whose inner fortifications enclose temples, palaces, and other public buildings. The ruins of the ziggurat remain a landmark. The river Tigris once ran alongside the massive quay wall, but has changed its course and now flows at some distance. Here in 1845-51 Layard found the magnificent series of reliefs in the palaces of Ashurnatsirpal II, Shalmaneser III, and Esarhaddon (the "burnt palace") placed in the British Museum. Excavations from 1949 brought to light fine ivories, the ornamentation of palace furniture, and other treasures.

Calais. Seaport and fortified town of France, in the dept. of Pas-de-Calais. It stands on the Strait of Dover, 18 m. E.S.E. of Dover and 185 m. by rly. N. of Paris. It consists of an old town on an island, formed by the harbour and canals, and of the surrounding suburbs.



Calais arms

The town was almost totally destroyed during the fighting of May, 1940, and Sept., 1944. Of its old buildings the chief were the church of Notre Dame, the

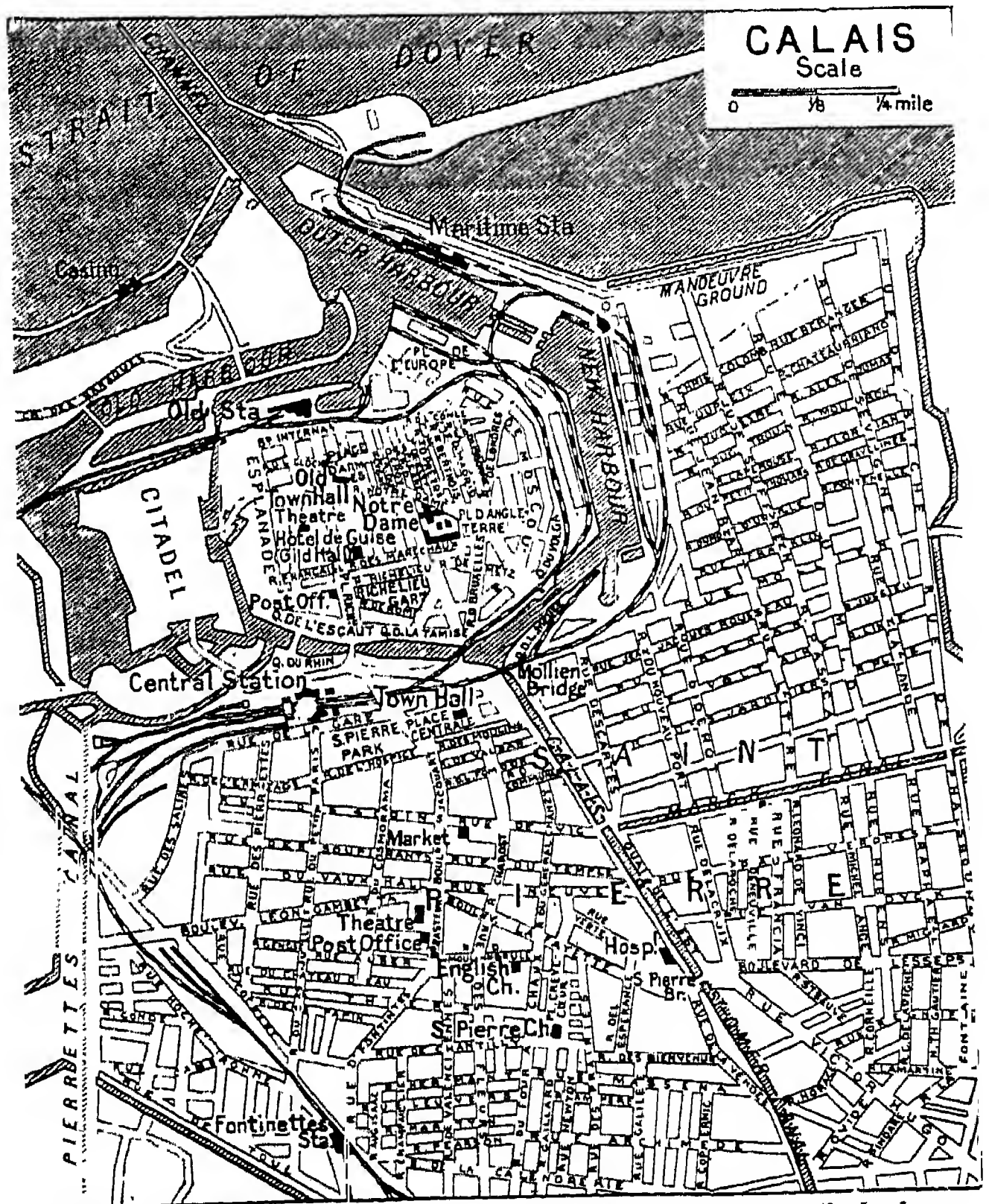
citadel, the watch tower, and the town hall on the Place d'Armes. It had ancient fortifications and remains of a guild hall built by Edward III for the woolstaplers. There were a modern town hall, with museum, and a casino. Calais is the chief port for the traffic between England and France. It is a fishing centre, and manufactures various synthetic textiles, paper pulp, and chemicals. There is an aerodrome. Pop. (1954) 60,340.

In the 10th century Calais was under the rule of the counts of Boulogne. The town remained in the hands of the English from its siege by Edward III in 1347 until its loss under Mary I in 1558. Its modern prosperity began with the introduction of lace manufacture early in the 19th century, and increasing intercourse with England.

In the First Great War it was an Allied base, and underwent 60 bombardments by Zeppelins, aeroplanes, and warships, about 2,000 bombs and shells falling in the town, killing 230 persons and injuring 400. The town was awarded the Croix de Guerre.

THE SECOND GREAT WAR. By the third week of May, 1940, the lines of communication of the retreating B.E.F. in France had been cut by the German armoured divisions (*see* British Expeditionary Force). On May 22 a small British force was sent to Calais with the object of establishing a supply route along the coast to Dunkirk. It was made up of battalions of the King's Royal Rifle Corps, Queen Victoria's Rifles, the Rifle Brigade, and the Royal Tank Regt., with an anti-tank battery of the Royal Artillery, all under the command of Brig. C. Nicholson. On landing, the original aim of the force was found to be impossible; but it was decided to hold the port.

On the 24th the Germans closed in on the town, and there was continuous fighting. Often the defences were pierced by German tanks and infantry, which were as often thrown out again. After sustaining the attacks of two Panzer divisions and incessant low-level dive-bombing for four days, the survivors of this force of



Calais. Plan of the port and town as it was before 1940, showing the harbours and the old town protected by the citadel

some 3,000 men were overwhelmed; but their heroic defence had made possible the "miracle of deliverance" at Dunkirk.

After the collapse of France the Germans used Calais as an "invasion" port and installed long-range guns in the vicinity, which shelled British shipping in the Strait of Dover and English south coast towns. Barge concentrations, shipping, and gun emplacements were frequently attacked by Allied aircraft. On Sept. 20, 1944, Calais was invested by formations of the 1st Canadian army engaged in clearing the Channel ports; and an assault was launched on Sept. 25 after the fortifications had been heavily bombed by the R.A.F. Operations ceased on Sept. 29 while the remaining civilians were removed. The Canadians resumed the attack on Sept. 30, strongly supported by the R.A.F.; and the Germans surrendered Oct. 1.

Calais, BURGHERS OF. See Burghers of Calais.

Calama. Oasis town of Chile, in the prov. of Antofagasta. Situated in the Andes at an alt. of about 6,800 ft., it is on the river Lao and the rly. from Antofagasta to La Paz, in Bolivia. It is important as the only place on the line in the mts. where drinking-water is obtainable. Explosives are made; and there are copper mines near by. Pop. (est.) 7,000.

Calamander Wood. Timber of a large tree (*Diospyros quaesita*) belonging to the family Ebenaceae. It is a native of Ceylon, where the Sinhalese use it in the manufacture of beautiful furniture, but its exceeding hardness (it is a kind of ebony) makes it difficult to work.

Calame, ALEXANDRE (1810-64). Swiss painter. Born at Vevey, Switzerland, May 28, 1810, he studied at Geneva under François Diday, and in Paris, Holland, and Italy. He became the acknowledged head of the Genevese school. His Waterfall of Handeck (canton of Berne) attracted attention at the Paris Salon in 1839, and his other works include Monte Rosa, The Bernese Oberland, Mont Blanc, and The Lake of the Four Cantons. He died at Mentone, March 17, 1864.

Calamianes. Group of the Philippine Islands. They lie between Mindoro and Palawan, and cover an area of 680 sq. m. The principal islands are Busuanga, Culion, and Coron. Hilly, hot, and unhealthy, and mostly infertile, they produce timber, wax, honey, and edible birds'-nests.

Calamine. Term used in medicine for basic zinc carbonate, a powder commonly made up into a lotion used to treat various skin irritations, including sunburn. The presence of iron compounds gives it its characteristic pink colouring. In geology the name calamine is used in the U.K. for the mineral zinc carbonate (called in the U.S.A. smithsonite). In the U.S.A. it is used for hydrated silicate of zinc (called in the U.K. hemimorphite). See Hemimorphite; Smithsonite.

Calamites (Gr. *calamitēs*, reed-like). Extinct genus of plants similar in many respects to the living *Equisetum* (horsetail), but larger in size and having a hard woody stem. In Palaeozoic times they formed the chief forest growth, reaching from 50 ft. to 100 ft. in height. The calamites attained their maximum development in Coal Measure times, becoming less plentiful and less varied in the Permian and Triassic periods, when they were replaced by the true *Equisetum*.

Calamy, EDMUND (1600-66). English Puritan divine. Born in London, and educated at Pembroke Hall, Cambridge, he was ordained in the Church of England and was for a time chaplain to the bishop of Ely. Lecturer for ten years at Bury St. Edmunds, he was known as a



Edmund Calamy,
Puritan divine
After Dobson

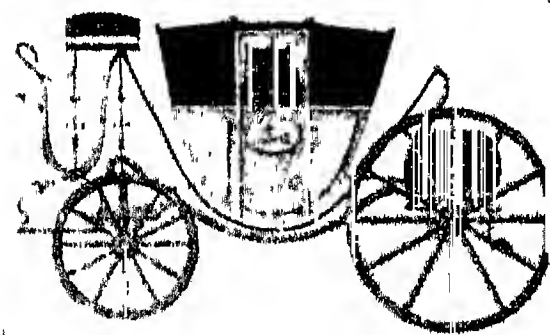
leading man on the Presbyterian side in the controversy over episcopacy, and in 1639 was appointed minister of St. Mary Aldermanbury, London. He opposed the execution of Charles I, and at the Restoration became a chaplain to Charles II but declined the bishopric of Lichfield. Under the Act of Uniformity he was ejected from his living in 1662, and died Oct. 29, 1666.

Calarasi. Town and river-port of Rumania, in Marca department. It is on an arm of the Danube, opposite Silistria, 55 m. by rly. S.E. of Bukarest, and exports grain, timber, hemp, and fish. Pop. 4,736.

Calas, JEAN (1698-1762). French merchant. Born in Languedoc, March 19, 1698, he was living at Toulouse when in Oct., 1761, his eldest son hanged himself. Popular fanaticism accused the father—a Calvinist—of hav-

ing murdered the son because he had desired to become a Roman Catholic. Calas made a powerful defence on his own behalf, but local passions ran too high for any appeal to reason to gain a hearing. The local parlement, March 9, 1762, condemned him to be broken on the wheel, and the sentence was carried out the following day. The widow fled to Switzerland, where she enlisted the sympathy of Voltaire, who induced the king to annul the sentence passed at Toulouse. Calas was declared innocent, and his family awarded 30,000 livres. The case was made the subject of three plays in France, and was in its reversal of judgement a great triumph for Voltaire, who roused public opinion by his book *Sur la Tolérance*, in which he showed that intolerance and popular fury had been responsible for the gross miscarriage of justice by the Toulouse authorities.

Calash (French *calèche*, Polish *kolaska*, carriage). Term formerly applied to a light four-wheeled



Calash. An early example of this light four-wheeled carriage

carriage often fitted with a folding hood. In Canada it denotes a two-wheeled carriage. The word came to be applied to the hood only, and hence to a woman's head-covering made of silk and whalebone.

Calatafimi. Town of Sicily, in the prov. of Trapani, 30 m. direct and 52 by rly. S.W. of Palermo. It takes its name from Kalat-al-Fimi, a Saracenic castle dominating it. Near by are ruins of Segesta, and 2 m. to the S.W. the Neapolitans were defeated by Garibaldi May 15, 1860. A street is named after Samuel Butler, the author of *Erewhon*, who lived here. Pop. (1951) 11,370.

Calatayud. City of Spain, in the prov. of Saragossa. It is 52 m. S.W. of Saragossa, on the rly. to Madrid. The Moorish town has many dwellings cut in the rock on which Kalat Ayub (Castle of Ayub) was built out of the ruined Bilbilis, 1½ m. to the E., the birthplace of Martial (q.v.). The former mosque is now the church of S. Maria, and Santo Sepulcro, founded in the 12th and restored in the 17th

century, was the church of the Knights Templars. Calatayud is an agricultural centre. Pop. (1950) 18,762.

Calatrava. Ruined stronghold of Castile, Spain. It is on the Guadiana, 12 m. N.E. of Ciudad Real. It was captured from the Moors in 1147, and was defended in 1158, when the heroism of its defenders led to the creation of the Order of Calatrava (*v.i.*).

Calatrava, ORDER OF. Spanish order. It originated among the Cistercian lay brothers, many of



Calatrava. Badge of the Order

them knights, who organized the recovery of Calatrava from the Moors, 1147, and defended the place, 1158. It received its first statutes in 1164, and these were confirmed by Pope Alexander III, who conferred privileges on the knights. Ferdinand and Isabella assumed control of the order in 1487, thus revoking its independence, which had led to much civil disturbance. After 1808 the order became an order of merit. The badge is a red cross with fleur-de-lis, and the ribbon is red.

Calauria (mod. Poro). Island in the Gulf of Aegina, off the E. coast of the Morea, Greece. Rocky and small, it shelters a harbour and has a town where, in 1828, the ambassadors of Great Britain, France, and Russia settled the government of the new kingdom of Greece. In ancient times Calauria was the centre of an amphictyonic council of seven maritime cities—Aegina, Athens, Epidaurus, Hermione, Nauplia, Orchomenus, Prasiae—which lost its importance when Argos and Sparta took the place of Nauplia and Prasiae. In Calauria was a famous sanctuary, the temple of Poseidon, where Demosthenes killed himself in 322 B.C. when he saw that he would be arrested, and within the precincts of which he was buried. Excavations in 1894 revealed remains of the temple and other buildings.

Calaveras. River of California, U.S.A. It rises among the foothills of the Sierra Nevada, a mountain chain running along the E. border of Calaveras co., and flows in a S.W. direction for 120 m., when it joins the San Joaquin river.

Calaveras. County of California, U.S.A. Bounded E. by the Sierra Nevada, it is rich in minerals.

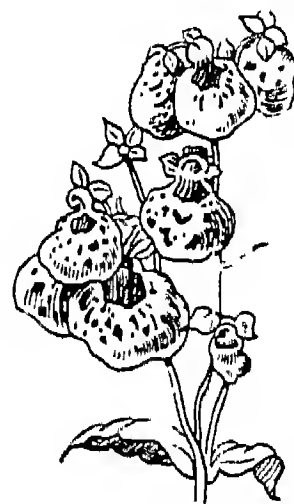
It is also chiefly noted for its groves of giant sequoia. The capital is San Andreas. Area 1,028 sq. m. Pop. (1950) 9,902. The Calaveras skull found in 1866 was alleged to have come from a mineshaft through undisturbed gravels at a depth of 130 ft. where it seems to have been placed as a hoax. It was accepted by J. Dwight Whitney and others as evidence of American man in Pliocene times, but was shown to be typical of modern aboriginal tribes.

Calaverite. A gold telluride (AuTe_2), having 43 p.c. gold with subordinate silver. It generally occurs as small crystals striated parallel to their length; also granular and massive. The colour is silver-white, often with a faint yellow tinge. Deposits occur in California, at Cripple Creek in Colorado, and at Kalgoorlie in W. Australia.

Calcareous Soil (Lat. *calcareus*, of lime). Soil which contains 5 p.c. or more of lime. In Great Britain its presence is usually due to a chalky subsoil, but calcareous soils also occur over limestone and in regions of low rainfall where lime accumulates near the surface. Where the topsoil is of clay, the mixture, if properly worked and dug, makes up into a fair loam. Skilful cultivation is necessary, or else the soil dries into hard, steely lumps that will not break down. The fertility of a calcareous soil depends upon the thickness of the topsoil: a shallow soil on a chalky hillside will grow little and is best left uncultivated. Loamy calcareous soils of good depth usually respond well to manuring, especially with nitrogen and potash. Most farm crops and many garden plants flourish on such soils, but acid-loving plants such as heaths and rhododendrons do badly.

In many parts of Great Britain, notably in some parts of Kent, the chalk comes near to the surface, and such soil, even though fertile, is suitable only for the cultivation of comparatively shallow-rooting plants such as beans and salads. Much similar land was ploughed up for arable crops during the Great Wars, but such soils tend to dry out easily and the crops may suffer from drought in a dry spring; they may also suffer from potash deficiency.

Calceolaria (Latin *calceolus*, little shoe). Genus of perennial plants of the family Scrophulariaceae, native to South America. Height ranges from 9 ins. to 1½ ft. The pouchlike flowers are



Calceolaria. A greenhouse variety

yellow, purple, brown, etc. In Great Britain, the shrubby species and their hybrids are grown in summer flower beds and are treated as half-hardy. The herbaceous species and their hybrids with showy, often speckled blooms, much larger than

those of outdoor species, are grown under glass for flowering in May and June. They are treated as greenhouse biennials.

Calchaqui. South American Indian tribe, most important of the Diaguita group. The name is sometimes applied to the whole Diaguita culture. They resisted the Spanish invasion with great ferocity, thus receiving considerable attention in the Conquest records—information amplified by archaeological finds. An early immigrant wave of megalithic builders is attested by their dry-stone dwellings (*pirca*), stone terraces for maize cultivation, and sculptured monoliths. They wove llama wool and apparently tamed the rhea and peccary. Their metal work, in gold, silver, and copper, shows Inca influence. In the Lerma valley there are 1,500 earthen mounds, most of them surrounded by stone circles. Except for their decorated funeral urns, their pottery was thick and crude. They were divided into local groups each under an absolute cacique. The present mestizo population of N.W. Argentina exhibits Calchaqui elements.

Calchas. Famous soothsayer, son of Thestor, who accompanied the Greeks during the Trojan War. He foretold the wrath of Apollo, and from the number of a flight of sparrows that the war would last 10 years. He died of grief after he had been proved inferior as a soothsayer by Mopsus, son of Apollo.

Calcifereous Sandstone (Lat. *calx*, lime; *ferre*, to bear). Name applied to a series of sandstones, marls, and clays. With thin coals, cement-stones, and limestones, it forms the lowest division of the carboniferous rocks of S. Scotland, and is equivalent to part of the Carboniferous Limestone Series of England and Wales. It passes downwards into the Old Red Sandstone, and upwards into a calcareous series—the Carboniferous Limestone of Scotland.

This rock-series was being deposited during a period of volcanic activity, in Scotland, as is shown by lava flows and volcanic vents which occur interbedded or associated with it.

Calcination (Lat. *calx*, lime). Metallurgical process by which ores are heated to temperatures below their melting points either to expel matter such as carbon dioxide, water, or volatiles, or to alter the physical condition of the ore as a preliminary to later processes. Because of its similarity to the more general process of roasting, the terms are sometimes regarded as synonymous, but there is an important distinction. Roasting is accompanied by a chemical change, resulting in the addition of an element (often oxygen). Calcination does not involve such chemical action, heat alone being the active agent. A typical example is the heating of iron ores to expel water and to increase their permeability to reducing gases during subsequent smelting in the blast furnace.

The older methods of calcination, such as stall or heap calcining, are, perhaps, better described as roasting, since the ore is exposed to the oxidising action of the atmosphere. Some examples of modern calciners are: (1) vertical kilns, simple shaft furnaces suitable for limestone or smithsonite, which may be calcined in (2) reverberatory furnaces or (3) rotary cylindrical calciners with continuous discharge, similar furnaces being used at higher temperatures in the preparation of bauxite for aluminium production or for refractories: the very high temperatures necessary for dolomite are attained by (4) cupola furnaces with coke as fuel. See Kiln; Metallurgy; Ores; Roasting.

Calcite. A naturally occurring mineral. Its composition is calcium carbonate, CaCO_3 ; its crystal system is hexagonal or rhombohedral. Calcite is strongly double-refractive, and the clear variety (Iceland spar) is used in the manufacture of optical instruments. Other notable varieties include prismatic crystals (nail-head spar and dog-tooth spar), compact fibrous variety (satin spar), cellular (calcareous tufa, travertine), nodular (stalactites), compact (limestone, marble), and earthy (chalk). Calcite, one of the most widely spread minerals, has a variety of uses according to its purity and character. It makes bleaching powder, calcium

carbide, etc.; some limestones are used as road metal and in cement manufacture; compact calcareous rocks are important building stones; it may be used as a flux in smelting.

Calcium (Lat. *calx*, lime). Metallic element, symbol Ca, atomic number 20, atomic weight 40.08. It is silvery-white, malleable, has a density of 1.55, melts at 810°C ., boils at $1,175^\circ\text{C}$. It is a constituent of lime, limestone, marble, dolomite, and chalk, and forms about 3.5 p.c. of the earth's crust; it is found in sea-water to the extent of about 0.05 p.c.

Sir Humphry Davy prepared in 1808 small globules of the metal by passing an electric current through a fused mixture of lime and potash. Acting on a suggestion of Berzelius, he was able to obtain an amalgam of mercury and calcium and by distilling off the mercury to prepare a reasonable quantity of the metal. A better method of isolating calcium was devised by Moissan in 1898. It is now made by the electrolysis of fused calcium chloride and calcium fluoride.

Calcium oxides are three in number: calcium oxide, CaO (quicklime); calcium peroxide, $\text{CaO}_2 \cdot 8\text{H}_2\text{O}$; calcium tetroxide, CaO_4 . Quicklime is an important fertiliser, for calcium is a necessary constituent of plant tissues and, as the calcium in the soil is slightly soluble in rain water, it is necessary to replenish the supply of it in the top layers. Quicklime is made on a large scale by heating limestone (calcium carbonate) in kilns at 800°C . to $1,000^\circ\text{C}$. It is a white, amorphous powder, used as a constituent of cement. When water is added to quicklime slaked lime is formed in accordance with this equation, $\text{Ca} + \text{H}_2\text{O} = \text{Ca}(\text{OH})_2$. Slaked lime is used for making mortar and plaster, in bleaching powder, and for the purification of coal-gas. When chalk or limestone is mixed with clay and sand and heated in a cylindrical rotating furnace, Portland cement is formed, consisting mainly of calcium aluminates and calcium silicates. Such cement when mixed with sand and gravel and water forms concrete. Calcium peroxide is formed by adding hydrogen peroxide to lime-water. Calcium tetroxide is a yellow powder obtained by heating the peroxide with hydrogen peroxide solution.

Calcium carbonate, CaCO_3 , forms the rocks, chalk, and limestone which were originally deposited

at the bottom of the sea and are largely of animal origin, shells, corals, etc. It is also found in two crystalline forms, calcite (*v.s.*) and aragonite. Calcite forms the common dog's-tooth spar and Iceland spar, also satin-spar; marble and onyx are calcite. Purified chalk is the solid constituent of whiting. Dolomite is a mixture or loose compound of calcium carbonate and magnesium carbonate with the formula $\text{CaCO}_3 \cdot \text{MgCO}_3$.

Calcium fluoride, CaF_2 , occurs in many places as fluor spar, of which the mineral Blue John is a bluish or violet variety. Fluor spar is used for making special lenses, for glazing pottery, and as a flux in the Bessemer process of making steel.

Calcined bones contain about 70 p.c. of *calcium phosphate*; apatite is an impure calcium phosphate. When calcium phosphates are treated with sulphuric acid a mixture results, known as superphosphate, an important fertiliser. Basic slag obtained in the Bessemer process for making steel contains this phosphate.

Calcium gluconate, the calcium salt of an oxidation product of glucose, is used for intramuscular injections, and is helpful in cases of malnutrition, neurasthenia, hay-fever, and calcium deficiency. **Calcium glycerophosphate** is a constituent of many proprietary nerve tonic foods. **Calcium lactate** is a remedy for chilblains and valuable in cases of calcium deficiency. **Calcium sulphate**, CaSO_4 , occurs in rock formations as anhydrite, gypsum, and alabaster. The hemihydrate, $2\text{CaSO}_4 \cdot \text{H}_2\text{O}$, is known as plaster of Paris.

Calcium nitrate, $\text{Ca}(\text{NO}_3)_2$, is of frequent occurrence in soil, where it is formed as the result of the decomposition of organic substances in the presence of chalk or lime. It is made on a large scale by treating chalk or limestone with nitric acid obtained by the action of the electric arc on the atmosphere, and is a valuable fertiliser.

Calcium carbide, CaC_2 , is a greyish solid made by heating in an electric furnace a mixture of about 100 parts of quicklime and 70 parts of coke, at about $1,100^\circ\text{C}$. It is extensively made in Norway, where cheap electricity is obtained from water power. Calcium carbide is used for the generation of acetylene, C_2H_2 , made by the addition of water to the carbide.

Calcium cyanamide, CaCN_2 , also known as nitrolim, is a fertiliser

made by heating calcium carbide in a stream of nitrogen. If calcium cyanamide is heated with water in an autoclave under proper conditions, ammonia gas is produced. This is one method for the fixation of atmospheric nitrogen.

Calculating Machines. Machines for calculating mechanically. The first practical mechanical calculating machine was built by Blaise Pascal in 1642, and its basic principles are incorporated in many of those used today.

Calculating machines add, subtract, multiply, and divide, and there are two main types. On one the depression and instant release of the keys actuate the computing mechanism; on the other, the keys are set and remain depressed until the computing mechanism is actuated, by turning a crank or by other means.

The first practical machine to add or to add and subtract and to give a printed record of the totals was invented by William Seward Burroughs (1857-1898). The amounts to be calculated are set up on the keyboard, and when the handle is operated the amount is printed and added or subtracted simultaneously.

Book-keeping and accounting machines combine a typewriter keyboard and automatic adding-subtracting mechanism and are electrically operated. They are used for posting and balancing sales, purchases, and general ledgers, stock and cost records, dividend warrants and summaries, wages records, and for analytical, statistical, and tabulating work.

Electronic calculating machines are designed to handle large numbers of relatively simple and similar computations and to keep relative records: *e.g.* stores accounting, costing, and the determination of weekly payments for large bodies of hourly-paid workers, taking into account P.A.Y.E., bonus, etc. Data are fed into the machine from punched cards; results are received from it in the same form—if desired, on the same cards. An electronic calculator will handle numbers of 8-20 digits, operate in decimal quantities or sterling, self-check every calculation, and handle 6,000 cards per hour.

The electronic office calculator is normally a digital computer and its duties are usually confined to very high addition and multiplication. Laboratory instruments, on the other hand, are nearly always designed for such tasks as solving differential equations which they

can complete in a few seconds as against the mathematician's several months. Such a machine is the A.C.E. (automatic computing engine) of the National Physical Laboratory. An important feature of these machines is the inclusion of "memories" or "stores" which hold or maintain figures or instructions until such time as they are required in the computation. Usually the results of the calculations or answers are given on punched cards.

In analogue computers, all the normal arithmetical processes are simulated by analogous electrical processes: in digital computers they are affected by digit-by-digit addition. In analogue computing, addition of two numbers is carried out by passing a constant current through two equal calibrated potentiometers. If the positions of the sliders are set to represent the two individual numbers, the combined output voltage represents the sum of the two numbers in terms of the total voltage across the two potentiometers. Subtraction, multiplication, and division are effected in a similar manner. Differentiation and integration are effected by the use of suitable electrical networks embodying resistors and capacitors. Where these networks have to be connected one after another, high-gain amplifiers with strong negative feed-back are inserted between the stages to provide amplification and to maintain accuracy.

With digital computers, the digit-by-digit addition or counting is carried out by applying electrical pulses, each representing a digit, to a special counting circuit. This in turn applies a pulse to another similar circuit after it has itself received a specific number of pulses such as 10 (decimal scale) or 2 (binary scale). The binary scale is generally preferred because it is less subject to errors. To count up to large numbers, the number of circuit stages can be increased indefinitely and the counting rate can be as high as 100,000 per second. Decimal counting can be effected by an elaboration of this circuit, but a simpler technique uses special multi-electrode cold-cathode tubes. All the original pulses into the machine are initiated by "instructional operators" such as punched cards. Computers of this type embody several hundred valves.

Calculus. In the broadest sense, a method of calculation, the name being derived from the prim-

itive practice of counting by means of small stones or pebbles. The infinitesimal calculus deals primarily with the calculation of the rates of change of varying quantities (differential calculus), and of the total change in a quantity which has been varying in a specified manner (integral calculus). The practical importance of this study derives from the fact that we live in a changing universe, in which all measurable quantities are continually varying; in the application of mathematics to the physical world the methods of the infinitesimal calculus are therefore of the greatest service.

Consider a train travelling at the uniform rate of 30 miles an hour. If it travels y miles in x hours, then $y=30x$. In this statement x may have any value, and the corresponding value of y can be at once found from the equation; x is said to be a "variable," and y is called a "function" of x . The conception of the variable is fundamental to the calculus; a letter which can stand for any number is exactly adapted to represent a measurable quantity, such as time elapsed or distance covered, which is constantly changing. The relation of functional dependence, by which y is connected with x , corresponds to the invariable correlation between two phenomena which is the simplest example of what we call a law of nature; *e.g.* the distance the train has covered is a function of the time elapsed just as the current flowing through a given metallic filament is a function of the electromotive force, and the temperature of the filament is a function of the current.

At this point we may introduce the idea of the "differential coefficient." If y is a function of the variable x , the value of y can be determined from the appropriate formula when the value of x is known; evidently a change in the value of x would produce a change in the calculated value of y . Consider a small change h in the value of x , in other words consider two values of x which differ by h , and call them x and $x+h$. (The ambiguity in using the same letter x for the variable and for a value of the variable is somewhat puzzling at first, but its extreme usefulness must be its excuse.) Then let us call y that value of the function which corresponds to the value x of the variable, and $y+k$ the value which corresponds to $x+h$. (It is true that y may diminish when x increases; in that case k is negative,

when h is positive.) The fraction k/h may be called the average rate of increase of y with respect to x over the given interval h . In the simple case where $y=30x$, it is clear that $y+k=30(x+h)$, and by subtraction that $k=30h$. Hence in this case, whatever value we take for h , $k/h=30$. Where the functional relation is not that of simple proportion, the fraction k/h is found to assume different values for different values of h , so that the average rate of increase of y with respect to x over a small interval depends on the size of the interval. An illustration will make this clear. Consider the function $y=x^2$; fix on the value $x=6$, and consequently $y=36$. If $h=1$, $x+h=7$, $y+k=(x+h)^2=49$, and $k=13$, so that, when $h=1$, $k/h=13$. Now let h assume in succession the values $\frac{1}{2}$, 0.1 , 0.01 , 0.0001 ; simple arithmetical calculation gives for k/h the respective values $12\frac{1}{2}$, 12.1 , 12.01 , 12.0001 , and it is apparent that the smaller h is taken the nearer k/h approaches to the fixed limit 12. And it is found to be true of most functions that k/h approaches a fixed limit when h is made continually smaller. This limit is called a "differential coefficient" and it represents the rate of increase of y compared with that of x , not over any interval, but actually at a fixed value of x .

We may take the case of $y=x^2$ purely algebraically and say $y+k=(x+h)^2$, and therefore $k=(x+h)^2-x^2=x^2+2xh+h^2-x^2=2xh+h^2$, and $k/h=2x+h$. Hence as h becomes continually smaller k/h approaches the limit $2x$. (This result agrees with the former for the fixed value $x=6$, when $2x=12$.) We say that $2x$ is the differential coefficient of the function x^2 . Thus for every value of x there is a corresponding value of the function, and likewise a corresponding value of the differential coefficient which indicates the rate at which the function is increasing compared with x at that value of x . In the specific case taken, the differential coefficient of x^2 has the value 12 when $x=6$, which means that when $x=6$ x^2 is increasing 12 times as fast as x .

The differential calculus embraces a general method (differentiation) for readily calculating the differential coefficients of various functions. In the integral calculus the problem is reversed: given the differential coefficient we have to find the function; in other words, given the rate of change, we have to find the function which changes

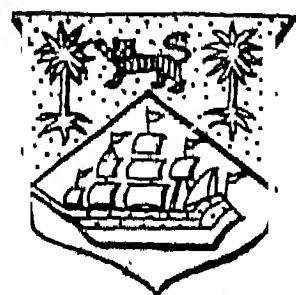
at just that rate. This process is called integration; it may also take the form of finding the increase in the function between two values of the variable. Integration may be regarded from another standpoint, as a process of summation, the total change in the function being considered as made up of a large number of very small changes, and from this point of view the integral calculus is of the greatest use in evaluating areas and volumes. For example, the volume of a cone may be found by considering it as made up of a very large number of very thin circular disks, the radii of which steadily increase with their distances from the vertex of the cone.

The methods of the integral calculus were, to some extent, used by the ancient Greek mathematicians, including Archimedes. The fundamental ideas of the different calculus were first explored by a group of 17th-century French mathematicians, notably Descartes. The systematic foundation of the calculus was due to Newton and to Leibniz. It may be said that we owe the inception of the infinitesimal calculus chiefly to the labours of Archimedes, Descartes, Newton, and Leibniz, four of the most powerful thinkers of all time. The calculus of variations deals with the rate of change of a function of a variable when not only the variable assumes different values, but also the form of the function is continually changing.

Calcutta. City of India, the capital of W. Bengal. It stands on the left bank of the Hooghli river in the Ganges delta, 86 m. N. of the Bay of Bengal, and at an altitude of 18-21 ft. Area 32.32 sq. m. (28.34 sq. m. within the city limits); pop. (1951) 2,548,677. The city lies across the river from Howrah; the famous bridge of boats connecting the two was replaced by a steel bridge, 1943.

Calcutta owes its great importance to its position at the centre of the densely populated region of Bengal, with its highly productive agriculture, and more recently to its place as the chief outlet for the valuable mineral resources of Chota Nagpur. The main exports are jute, ores and metal goods, coal, tea, vegetable oils, skins, and shellac; the chief imports include rice, sugar, manufactured goods, petroleum, machinery, salt, and hardware. The main port activities and the biggest dockyards are at Kidderpore, within the S.W. boundaries of the municipality.

The city is the centre of a concentrated industrial region extending from Hooghli town, 25 m. N., to Budge Budge in the S.



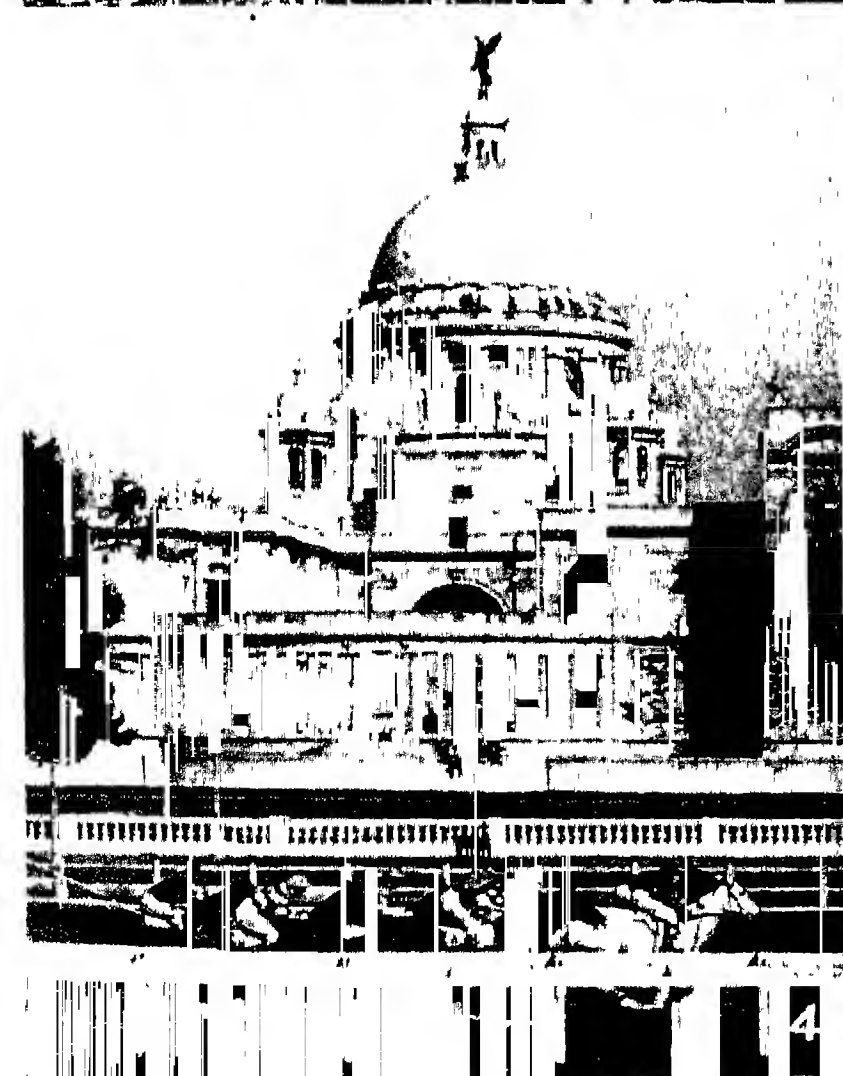
Calcutta arms

Jute goods constitute the principal manufacture—a field in which Calcutta leads the world. The first jute mill was

opened in 1855, power was introduced four years later; the industry in the 1950s employed 300,000 workers in some 100 mills. Although there was some shift of the jute industry to Pakistan after the partition of Bengal in 1947 left the chief jute-growing areas in that country, Calcutta remained supreme in its manufacture. Other textiles made include cotton, a rising industry, and silk. Steel rolling mills, metal and engineering industries employ some 95,000. Ship repairing yards, motor assembly works, railway workshops, and electrical engineering flourish; aluminium forging is of growing importance. Paper, chemicals, rubber, glass, paint, and pottery are among consumer goods made; printing, publishing, and silver refining are other industries. Hydro-electric development in the Damodar valley helped industry.

Badly located for such a large city, Calcutta was originally the site of three small villages. To one of them, Sutanuti, in 1686-1690, Job Charnock transferred the East India Company factory from Hooghli settlement, making the nucleus of the present city. Old Fort William was completed in 1702 for the defence of the factory; in 1707, with a population of about 10,000, Calcutta was declared a separate presidency. After increasing troubles in Bengal, Calcutta was captured by Suraj-ud-Dowlah, nawab of Bengal, in 1756, the fort seized and virtually destroyed, and its European inhabitants captured and imprisoned in the dungeon called the Black Hole (*q.v.*). Calcutta was recaptured by Clive and Admiral Watson early in 1757, and the present fort was built 1758-73. In 1773 the Bengal presidency was invested with control over all other possessions of the company in India, and Calcutta became the capital of British India until 1912, when Delhi became the capital.

The Maidan, called "the lungs of Calcutta," is a fine, park-like area giving the centre of the city a spacious aspect. E. of this is the main road, Chauringhi;

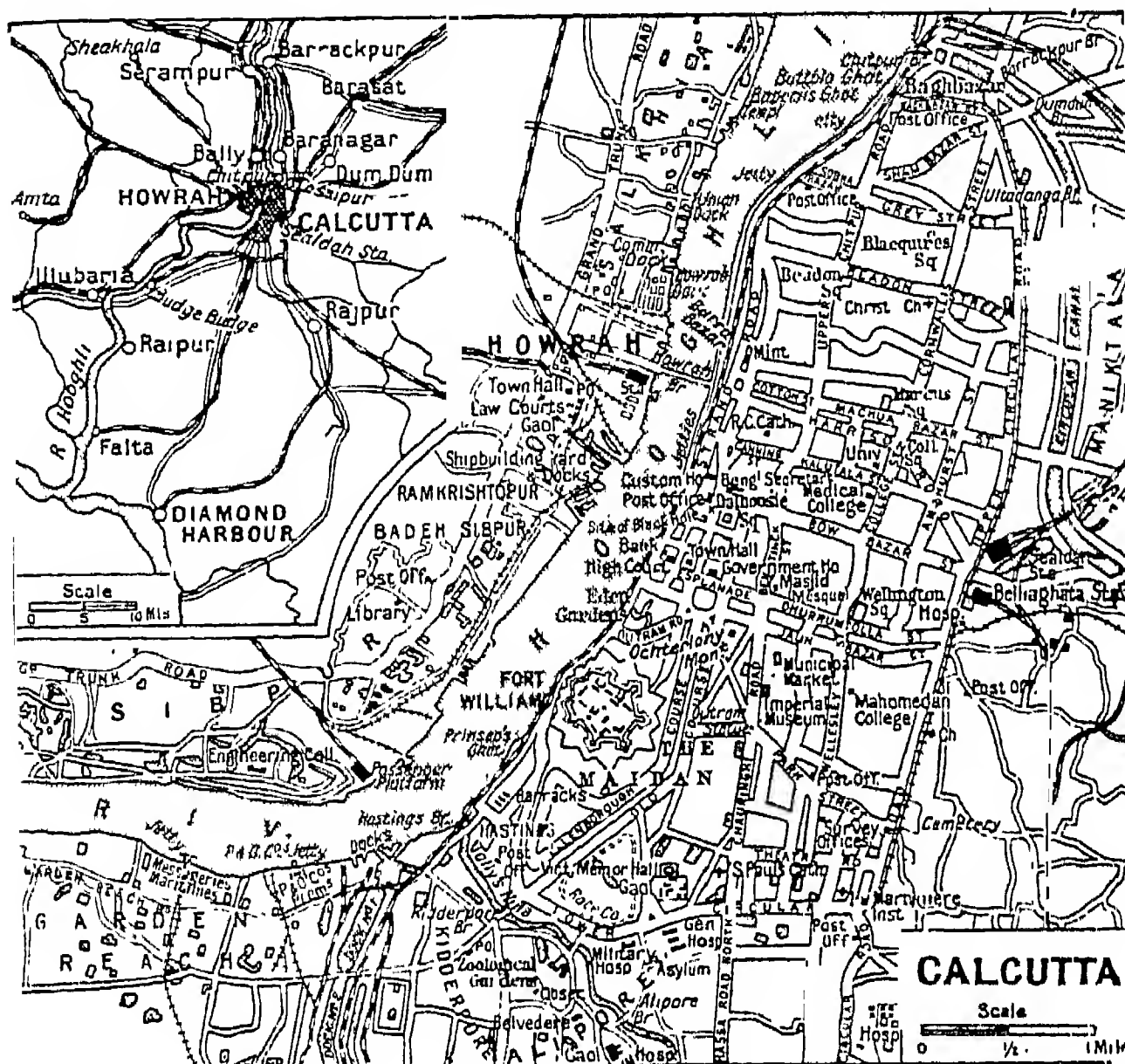


1. Air view of the city, looking across the Hooghly to Howrah; on the left is Government House, and the white-domed building to the right is the General Post Office. 2. Oriental design of the Temple of the Jains.

3. Classic façade of the Medical College Hospital. 4. All-India Memorial Hall seen from the racecourse; erected 1905 and cased with marble. 5. Chowringhee, a wide thoroughfare with numerous cafés and cinemas

CALCUTTA: VIEWS OF THE COMMERCIAL CAPITAL OF INDIA

Photos, 1, 2, 4, and 5, "The Statesman," Calcutta: 3, Topical



S. is Alipore, with the zoological and the botanical gardens, and beyond Kali Ghat, with the temple of Kali, a place of Hindu pilgrimage; W. is the river, with Howrah facing; N. is Dalhousie Square and the site of the Black Hole; also Government House, the executive seat of the governor of W. Bengal (formerly of the viceroy). N.E. lies the commercial and banking area, the University, the Bose Research institute, the famous Jain temple, and the Dakshineswar temple (home of the Ramakrishna mission). On all sides of the central part of the city are the dense residential areas, many of them concentrations of hovels of the worst kind, the bazaars, and the large villas of the wealthier residents.

During the Second Great War Calcutta was the principal Allied base for the Burma campaign, and was spasmodically raided by Japanese bombers. In Aug., 1946, serious communal rioting broke out in the city over the question of the partition of India, resulting in the death of nearly 3,500 people, as well as property damage to the value of over £1,000,000. The city has always been a "refuge" during times of famine, and during the floods and famine of 1943, and later in 1950, large numbers flocked into the town from the surrounding areas.

CALCUTTA UNIVERSITY. This institution, established in 1857, is mainly an inspecting and examining body, most of the teaching

being done in the numerous affiliated colleges; but it provides lectures and instruction for graduates. It has huge classrooms, laboratories, a hostel, and a library. It awards degrees in arts, science, law, medicine, engineering, agriculture, technology, and veterinary science. Including those at the affiliated colleges, the number of students is some 80,000.

Calcutta Cup. Trophy for Rugby football. Presented by the Calcutta Club in 1879, it is held by the winners of the annual match between England and Scotland.

Calcutta Sweepstake. Annual lottery promoted by the Royal Calcutta Turf Club. The prizes are awarded to drawers of horses running in the Derby. The

sweepstake is nominally limited to club members; but tickets were obtained by the public. No figures have been published since 1929 when prizes totalled £135,000.

Caldas. Department of central Colombia. In the Cauca valley, between the West and Central Cordilleras, it has fertile soil, and there is considerable mineral wealth. The chief products are coffee, sugar, cattle, and straw hats. The capital is Manizales. Area 5,160 sq. m. Pop. (1951) 1,068,180.

Caldecote, THOMAS WALKER HOBART INSKIP, 1ST VISCOUNT (1876-1947). British lawyer. Born March 5, 1876, he was educated at Clifton and King's College, Cambridge. He became a barrister in 1899 and was made a K.C. in 1914. He became head of the naval law branch of the Admiralty, 1918. He was Conservative M.P. for Central Bristol, 1918-29, and for Fareham from 1931. Knighted in 1922, he was thrice solicitor-general, twice attorney-general, minister for the Coordination of Defence 1936-39, twice Dominions secretary, and lord chancellor 1939-40. Made a peer in 1939, he was lord chief justice, 1940-46. He died Oct. 11, 1947.



Viscount Caldecote, British lawyer

Caldecott, RANDOLPH (1846-86). British artist. Born in Chester, March 22, 1846, he came to London in 1872 after working in a Manchester bank and began to draw for *The Graphic*, *Punch*, and other periodicals. He made



Randolph Caldecott. *Going to Cover*, a characteristic example (reduced) of this artist's sporting sketches in black and white

a great hit as an illustrator of books with Washington Irving's *Old Christmas*, 1875; and *Bracebridge Hall*, 1876. Caldecott's series of coloured books for children revealed his real *métier*. Beginning in 1878 with *John Gilpin* and *The House That Jack*



Spalding

Built, he produced two every Christmas until his death. The last two books were *The Great Panjandrum* Himself and *Elegy on Madame Blaize*. At Burlington House his most interesting contributions were bronze bas-reliefs of a Horse Fair in Brittany, 1876; and from Spenser's *Astrophel*, 1882. Caldecott was a member of the Royal Institute of Painters in Water Colours. He died after a prolonged illness in Florida, Feb. 12, 1886.

Calder. River of Lancashire and Yorkshire, England. Rising to the S. of Burnley, it flows 45 m. E. to the Aire, which it joins close to Castleford.

Calder, SIR ROBERT (1745-1818). British sailor. Born at Elgin, July 2, 1745, he entered the navy in 1759. He served under Sir John Jervis at the battle of Cape St. Vincent in 1797, and was knighted, and later created a baronet. In 1804, as a vice-admiral, he led the squadron that blockaded the enemy port of Ferrol. With a larger squadron he was ordered to look out for Villeneuve's fleet of French and Spanish ships returning from the West Indies, but the enemy slipped past him into Ferrol and escaped defeat. Calder was sent home, and at a court-martial was severely reprimanded. He died Aug. 31, 1818.



Sir Robert Calder,
British sailor
After Cook

Caldera (Port., cauldron). Circular or elliptical depression of volcanic origin and considerable size, many times larger than a crater. Some calderas may have been caused by big volcanic explosions. The majority are the result of collapse after violent ejection of lava and gas through a

central vent. This leads to the emptying of the lava reservoir below the base of the volcano. With the support removed, the overlying roof and volcanic pile above tend to founder on curved cylindrical fracture planes. Notable calderas include Crater Lake, Oregon, U.S.A., 20 sq. m.; Krakatoa, about 13 sq. m.; Niuafo'ou I., S. Pacific, about 10 sq. m.; and Santorin. Geological evidence shows that ancient volcanoes with large calderas existed in Scotland during the Tertiary period in the Island of Mull and at Ardnamurchan Point. Consult Calderas and their Origin, H. Williams, 1941.

Caldera. Seaport of Chile, in the prov. of Atacama. On Ingles Bay, it is the terminus of the rly. to Copiapó, the first built in S. America. It has no docks, but a good anchorage and mole. It exports ores, copper, silver, borax, and chinchilla furs.

Caldera Bay. Small opening of the Pacific Ocean in the north of Chile, its name being taken from the port standing thereon. It is famous for an incident during the Chilean civil war of 1891. On April 13, at night, the ironclad *Blanco Encalada* was lying at anchor in the bay when two torpedo boats belonging to the other faction steamed in. One of them fired a torpedo, which sank the larger vessel with 300 of her crew in a few minutes.

Calderon, PHILIP HERMOGENES (1833-98). British painter. Born at Poitiers, France, May 3, 1833, he was of Spanish descent. He came to London with his parents in 1841, and studied at Leigh's Academy. He first exhibited at the R.A. in 1853. His chief works were *Broken Vows*, 1857; *Catherine of Aragon and her Women at Work*, 1862; *The British Embassy in Paris on the Day of the Massacre of St. Bartholomew*, 1863; *Her Most High, Noble, and Puissant Grace*, 1866; and *S. Elizabeth of Hungary*, 1891, now called *The Renunciation*, one of the Chantrey pictures in the Tate Gallery. Elected A.R.A. in 1864, R.A. in 1867, he was made keeper of the Academy in 1887. He died April 30, 1898.

Calderon de la Barca, PEDRO (1600-81). Spanish dramatist. Born in Madrid, Jan. 17, 1600, he studied for six years at the university of Salamanca, and served for some time with the Spanish army in Italy and Flanders. He was already high in favour as a dramatist with the king and the public in

1636 when a volume of his plays was published, and in 1637 he was created a knight of the order of Santiago by Philip IV. In 1640 Calderon took part in the Catalan campaign, but left the army in 1642. In 1650 he joined the third Order of S. Francis, and in 1651 was ordained priest and given charge of a Madrid parish, and in 1653 became prebendary of Toledo. In 1663 he was appointed chaplain to Philip IV. After Philip died in 1665, his successor continued royal patronage of the dramatist. Calderon wrote his last play in his 81st year. He died in Madrid May 25, 1681.



Calderon de la Barca,
Spanish dramatist

Of Calderon's voluminous writings 118 dramas and 72 autos have been preserved. As a writer of the essentially Spanish auto, sacred allegorical drama, he is supreme, while as a dramatist he stands on a lower plane than his predecessor, Lope de Vega. If in characterisation Calderon was less successful, by the thought and poetry of his plays, by his mastery of stage-craft and his command of language he ranks high. There are English versions of his more notable plays.

Bibliography. Eng. tr. of *Selected Plays*, D. F. McCarthy, 1853, 1861, and 1873. E. FitzGerald, various dates; *Select Plays*, ed. N. MacColl, 1888; *The Spanish Drama*, Lope de Vega and Calderon, G. H. Lewes, 1846; *Calderon*, E. J. Hasell, 1879; *Essay on the Life and Genius of Calderon*, R. C. Trench, 1880; *Shelley and Calderon*, S. de Madariaga, 1920.

Caldy. Island off the S. coast of Pembrokeshire, Wales. It is 3 m. S. of Tenby, has 9 m. of coastline, and with the adjacent St. Margaret Island has an area of 472 acres. There is a lighthouse on Caldy. Remains exist of a priory founded before 1150, and there is a modern abbey belonging to a Benedictine community founded in 1896 by members of the Church of England who became Roman Catholics in 1913. The Benedictines left in 1928, but Cistercians from Belgium made a home here. The island yields Neolithic remains. An alternative spelling is Caldey.

Caleb. Son of Jephunneh, of the tribe of Judah. He was sent by Moses with Joshua to spy out the promised land and received Hebron as his inheritance (*Numb.* 13 and 14; *Deut.* 1; *Josh.* 14).

Caledon. A river of South Africa. Rising near Mont-aux-Sources in the Drakensberg, it flows about 220 m. S.W., passing between Basutoland and the Orange Free State to the Orange river near Bethulie. It has two main feeders, the Great and Little Caledon.

Caledon. Town of Cape Province, South Africa, in Caledon district. It is 87 m. by rly. S.E. of Cape Town. Noted already from c. 1700 for its thermal and mineral springs, it was named after the 2nd earl of Caledon, first British governor of the Cape. Pop. (1951) 3,832. The district is rich in wild flowers, especially proteas.

Caledon, EARL OF. Irish title borne by the family of Alexander since 1800. In the 17th century the Alexanders owned land in co. Londonderry, and were connected with the affairs of the city of that name. James Alexander, who held important posts in India, was made an Irish peer in 1790 as Baron Caledon, from the name of his property in Tyrone, a viscount in 1797, and an earl in 1800. Du Pré Alexander, the 2nd earl, was in 1806 the first British governor of the Cape of Good Hope, where his name is perpetuated.

Caledonia. Roman name for Britain N. of the firths of Forth and Clyde, sometimes still used poetically for Scotland.

Caledonian Canal. Waterway of Scotland. Extending for 60½ m. along the Great Glen from Moray Firth to Loch Linnhe, it is formed by the linking of Lochs Dochfour, Ness, Oich, and Lochy, through 23 m. of artificial cuttings. There are 28 locks each 160 ft. long, 38 ft. broad, and 15 ft. deep; they end at Corpach in a series of eight called Neptune's Staircase. Navigable by ships of 600 tons, the canal is freely used by fishing vessels and tourist steamers. The original survey was made by James Watt in 1773, and construction began under Thomas Telford in 1803. The canal was opened 1822, completed 1847; its cost was £1,311,270.

Caledonian Market. London cattle market. It occupied about 50 acres between York Road and Caledonian Road, Islington. Constructed to replace the old market at Smithfield, held since the Middle Ages, it was opened in

1855. Before the Second Great War the scene on market days (Tues. and Fri.) was one of the sights of London. The pedlars of Smithfield had been allowed to transfer their pitches to the new market, and by 1939 the average number attending had grown to 2,250 on Fridays, 1,600 on Tuesdays, offering a great variety of goods from cheap trinkets to fur coats. The market, closed during the war, was transferred in 1950 to a new site in Bermondsey.

Calendar (Lat. *calendarium*, account book). Systematic division of the year into months, weeks, and days. A year is the time occupied by the earth in making one complete revolution round the sun. The sidereal year is the time between two successive conjunctions of the sun with a fixed star; the solar or tropical year is the period between two successive passages through the vernal equinox. The mean sidereal year is 365 days, 6 hours, 9 mins., 9 secs.; the mean solar year 365 days, 5 hrs., 48 mins., 46 secs.

ANCIENT ROME. According to tradition, the Roman year was originally divided into 10 lunar months by Romulus. The month began with the new moon, and its appearance was announced by the *pontifex maximus* as the Calends. The first quarter (the 5th) was called the Nones (*novem*, nine) as being nine days before the full moon (the 13th) or Ides (*iduere*, to divide). The order of months was Martius, Aprilis, Maius,

after Feb. 23. The result was a cycle of years of 355, 377, 355, 378, totalling 1,465 days, equalling 4 solar years plus five days. The priests frequently forgot or purposely neglected to insert the intercalary month, and in the year referred to, according to the Christian calendar, as 46 B.C. the difference between solar and lunar years amounted to 90 days (67 and a Mercedonius of 23 days).

In formulating what is called the Julian (Old Style) calendar, Julius Caesar inserted 67 days between Nov. and Dec. so that the number of days in 46 B.C., known afterwards as "the last year of confusion," was 445 (355 plus 23 plus 67). Then, with the mathematician Sosigenes, he drew up a scheme, 45 B.C. being the first year of the Julian calendar. The new year was made to begin on Jan. 1, when consuls assumed office. To bring the 355-day year into line with the solar year, Caesar gave the months 31 and 30 days alternately, except Feb., which had 29. On the assumption that the true length of the solar year was 365½ days, it was decided that three ordinary years should be followed by an intercalary year of 366 days (leap year), in which Feb. 24 was counted twice. Later Augustus took a day from Feb., added it to his lucky month of Aug., and changed the days in the last four months to 30, 31, 30, 31.

The old names of Calends, Ides, and Nones were kept, but "in March, July, October, May, the Nones were on the seventh day" instead of the fifth, the Ides being correspondingly advanced two days. In reckoning time, days between the Calends, Nones, and Ides were counted according to their distance from them, both days being included. Thus Dec. 28 was the fifth day before the Calends of January, a.d. V Cal. Jan. (*ante diem quintum Calendas Januarias*); Feb. 24 was a.d. VI Cal. Mart., in leap year a.d. bis sextum Cal. Mart. (hence bissextile year). The first year of the reformed calendar (45 B.C.) being leap year, the fifth should have been the next leap year. But the priests intercalated a day every third year, so that by the year now called 9 B.C., three days too many had been intercalated. Augustus accordingly ordered three intercalary days to be struck out, from 9, 5, and 1 B.C., so that the next leap year was A.D. 4.

GREGORIAN REFORM. The Julian year of 365½ days was



Caledonian Canal. The lock at Fort Augustus, where the canal enters Loch Ness from the south

Junius, Quinctilis, Sextilis, September, October, November, December. Numa is said to have added Januarius and Februarius. Quinctilis and Sextilis were renamed Julius and Augustus by Julius Caesar and Augustus.

March, May, July, and Oct. had 31 days, Feb. 28, the rest 29, making a lunar year of 355 days. To make this tally with the solar year, an intercalary month (Mercedonius) of 22 or 23 days alternately was inserted every second year

longer than the solar year by 11 mins. 14 secs. The error therefore amounted to a day in 128 years, and in a few centuries the vernal equinox was falling ahead of the Julian calendar by several days. In 1582, when Pope Gregory XIII. with the aid of Aloysius Lilius, undertook the reformation of the Julian calendar, the error amounted to more than 10 days. Gregory suppressed 10 days so that Oct. 5 in 1582 became Oct. 15, and made the following rules for the future: Every year divisible by four to be a bissextile or leap year containing 366 days; every year not so divisible to consist of 365 days; but secular years, *e.g.* 1900, to be bissextile only if divisible by 400.

Under the Gregorian calendar there is still a slight error, but it amounts only to one day in 3,323 years. Excepting in leap years, when Feb. is allotted 29 days, the months from Jan. to Dec. have respectively 31, 28, 31, 30, 31, 30, 31, 31, 30, 31, 30, and 31 days.

"Old Style" and "New Style"

Adopted at various dates by different countries, the Gregorian method was not introduced in Great Britain until 1751 (24 George II, 1751, cap. 23). The error in the Julian calendar was then rectified by eliminating 11 days (11, not 10, because 1700 had been a leap year in Great Britain and not under the Gregorian calendar), the day after Sept. 2 becoming in that year Sept. 14, so that Sept. 3-13 inclusive are missing from 1752. Henceforward the Julian was called Old Style (O.S.) and the Gregorian New Style (N.S.). The legal year before 1752 began on March 25; this also was changed so that 1752 and subsequent years began on Jan. 1. For earlier years, it is usual in historical contexts to count Jan., Feb., and the first 24 days of March according to N.S. reckoning; but unless this is clearly stated it may lead to confusion: *e.g.* a man who to his contemporaries was born on Jan. 20, 1561, would, according to current practice, be given as born on Jan. 20, 1562. In many older books and documents such dates are printed Jan. 20, 1561-62.

For many centuries in Europe the beginning of the year varied. In England it was reckoned from Christmas Day until 1066; from Jan. 1, 1067-1155; from March 25, 1155-1751. Scotland made Jan. 1 New Year's Day in 1600.

Russia did not adopt the Gregorian calendar until after the

First Great War; which explains why the "October Revolution" broke out on the day Western Europe called Nov. 7, 1917.

JEWISH CALENDAR. The Jewish calendar reckons by the lunar months, but is adjusted to the solar cycle. The Passover must occur in the spring, and this is obtained by the system of intercalated leap years, which occur seven times every nineteen years. The Jewish leap year consists of thirteen lunar months. The lunar influence is seen in the celebration of the new moon by a special ritual, in the seventh-day sabbath, and in the estimation of all "days", which last from sunset to sunset. The lunar month occupies approximately $29\frac{1}{2}$ days; hence the Jewish month consists of 29 or 30 days, never of 31. The year has 353 to 355 days if common; 383 to 385 days if embolismic, *i.e.* containing an intercalated month.

The year begins at two periods. For the order of months, the New Year is in the spring (Nisan, beginning in March or April), and the months run: Nisan, Iyar, Sivan, Tammuz, Ab Ellul, Tishri, Marcheshvan, Kislev, Tebeth, Shebat, Adar. For the order of festivals, the New Year is in the autumn (Tishri, the seventh month, beginning in Sept. or Oct.). Roughly speaking, these are the civil and ecclesiastical years respectively. The change of date is made at the autumnal New Year. The Jewish calendar relates to the period assumed to have elapsed since the "Creation," estimated by the Talmud to have taken place 4,000 years before the destruction of the Temple by Titus, A.D. 70.

Jewish Festivals and Fasts

Of the festivals, the main group falls in Sept. or Oct. (New Year, Day of Atonement, Tabernacles). The Passover falls in March or April (often approximating to Easter), and Pentecost occurs seven weeks later (approximating to Whitsun). The Maccabean Feast of Dedication occurs in Dec., the Feast of Esther (Purim) a month before Passover. There are also several fast days *e.g.* the Day of Atonement (10th day of new year) and the Ninth of Ab (occurring in July or Aug.).

MUSLIM CALENDAR. This is dated from the Hejira or flight of Mahomet, July 16, A.D. 622. The Mahomedan year consists of twelve lunar months and usually of 354 days, but in eleven (*kabisshah*) years out of 30, of 355 days. Months have 30 and 29 days

alternately except that when the year has 355 days the last month has 30.

FRENCH REVOLUTION. The Convention of the French Republic, Nov. 24, 1793, ordained that the year should be dated from the foundation of the Republic. Although reckoned from Sept. 29, 1792, the new calendar was not introduced until midnight, Sept. 21-22, 1793; it lasted until midnight, Dec. 31, 1805. The months, named after the seasons, are set out below, with the corresponding Gregorian dates in year 1 (Revolutionary and Gregorian leap years did not coincide, so that later on the Gregorian dates varied from these by a day or two):

Vendémiaire (Sept. 22-Oct. 21)
Brumaire (Oct. 22-Nov. 20)
Frimaire (Nov. 21-Dec. 20)
Nivose (Dec. 21-Jan. 19)
Pluviose (Jan. 20-Feb. 18)
Ventose (Feb. 19-March 20)
Germinal (March 21-April 19)
Floréal (April 20-May 19)
Prairial (May 20-June 18)
Messidor (June 19-July 18)
Thermidor (July 19-Aug. 17)
Fructidor (Aug. 18-Sept. 16)

Each month was divided into three sections of ten days. Five days, dedicated respectively to virtue, genius, labour, opinion, and rewards, were added to the end of each year. In leap year, called an Olympic, a sixth day, called the Day of Revolution, was added.

ANCIENT EGYPT. The ancient Egyptians had from early times an agricultural calendar based on the recurring seasons and on the cycle, predictable almost to a day, of the rise and fall of the Nile flood upon which their life depended. Their year was of three seasons, Inundation, Sowing, and Harvest, and each season was divided artificially into 4 lunar months of 30 days each. But observations taken on the Nilometer over a period of many years would early have shown them that the true (*i.e.* solar) year was not 360 days but 365, so that five intercalary days were added after the last month of the year. This was the official calendar; but as time went on, since the true solar year is 365 days, 5 hrs., 48 mins., 46 secs., the error accumulated until the seasons of the official calendar ceased to bear any relation to the real seasons.

Astronomical observations arising from the rites in connexion with the daily rising of the Sun-god Re-Harakhte and his passage across the sky led to a more accurate series of prognostications for the sidereal year, and the

heliacal rising of the Dog-star, Sothis or Sirius, in particular was noted; several surviving records of the date in the civil calendar at which this annually-recurring phenomenon was observed in a given year of some Pharaoh's reign form the basis of current chronology for ancient Egypt.

BABYLONIA. The rivers Tigris and Euphrates are more erratic than the Nile, and in Mesopotamia the early calendar was based on lunar observations. Since the orbit of the moon is an ellipse, the actual length of time between full moons varies a little, and the Babylonians gave some of their months 29 and some 30 days, adding an intercalary month from time to time by royal edict to bring the resulting 12-month year of 354 days into line with the seasons and the observed heliacal rising of stars. The day was divided into double-hours, six to the day and six to the night. Not until the reign of Nabonidus, 585-539 B.C., was the Egyptian system adopted of adding a few days every year to adjust the calendar. The Babylonian New Year fell at the spring equinox, when the death and resurrection of the vegetation-god Marduk were enacted. In earlier times, each of the Sumerian city-states had its own calendar and celebrated its New Year according to the cult of its patron deity.

ASSYRIA. The ancient Hebrews seem to have been the only people to have had a seven-day week; but there is evidence that at one time the early Assyrians counted in periods of five days. Perhaps about 1100 B.C. they adopted the Babylonian "luni-solar" calendar of 12 months, though their months had different names. Intercalation was made in the late period, on the basis of elaborate tables, 7 times in every 19 years.

PRE-COLUMBIAN AMERICA. The Maya had the most complex calendar of the ancient American peoples. By observations spread over a long period, they measured the lengths of the year, and of the cycles of the moon and Venus, with greater accuracy than the Julian calendar. The Maya calendar consisted of cycles running concurrently. First was the Initial Series measured in days, and 20-day, 360-day, 7,200-day, and 144,000-day periods from an arbitrary beginning believed to be about 3000 B.C.; then came a 260-day cycle of 13 numbers combined with 20 named days; then a 365-day year of 18 months each

of 20 numbered days, plus 5 unlucky days; there were supplementary lunar and Venus cycles.

In the great hieroglyphic inscriptions of their Classic Period, dates are expressed in each of these cycles, and many of the glyphs represent gods, the god of the period carried through eternity by the god of the corresponding number. Each day was therefore under the patronage of many gods, some beneficent and some hostile in varying degree, and the priestly experts in interpretation had to be consulted to determine whether a day was propitious or not. They also calculated hypothetical dates far back in the past, in which each cycle stood in its proper relationship, showing that time was for them eternal.

Of great importance were the ends of the katuns, or 7,200-day periods, and they were marked by the erection of inscribed stelae. After the 10th century A.D. most of the cycles were dropped, and katun endings were designated by their final day in the 260-day cycle, which has led to difficulties in the correlation of Maya and Christian calendars, since the same designation recurs every 256 years. The Aztecs and other Central American peoples had similar calendars, but used only the 260- and 365-day cycles.

Much less is known about the Inca calendar. The Incas observed the positions of sunrise and sunset at sowing times from Cuzco by means of stone towers on the sky-

line to the east and west, and they may have observed the beginning of their year at the December solstice similarly, though this is doubtful. They used 12 lunar months, marked by new moons and subdivided by the four phases of the moon. Presumably the lunar year, which is 11 days short of the solar one, required frequent correction.

Bibliography. The Calendar, A. Philip, 1921; A History of the Calendar, S. H. Hooke, 1927; The World Calendar, E. Achelis, 1931; The Calendars of Ancient Egypt, R. A. Parker, 1951.

Calends OR KALENDS (Lat. *Calendae*). First day of the ancient Roman month. To undertake to pay a debt at the Greek Calends was proverbially the equivalent of an intention not to pay at all, there being no Calends in the Greek system of measuring time. See Calendar.

Calgary. City of Alberta, Canada, on the Bow and Elbow rivers. Oldest city of the prov., it is a divisional point on the C.N.R. and a junction on the main line of the C.P.R., about 42 m. E. of the point at which this rly. passes over the Rocky Mountains. Both rlys. have branches from the city to most parts of Alberta. An important trading centre for the surrounding district, Calgary exports cattle and sheep, engages in the manufacture of flour, leather, beer, etc., and has railway repair works. It is a supply centre for the British Columbia and Rocky

Mountains mining regions, also for the Turner Valley oilfield 40 m. distant, among the largest crude oilfields within the Commonwealth. Coal is available from the Rocky Mts. The city, which obtains natural gas from Bow Island, owns the street rly., waterworks, and lighting and power systems. Pop. (1951) 129,060.

Here are the Calgary branch of Alberta University, Mount Royal College, several schools for higher education, and many fine churches.



Calgary, Alberta. Principal city of N.W. Canada, Calgary is an important industrial centre. Here is seen Eighth Avenue, one of its main streets

Calhoun, JOHN (CALDWELL (1782-1850). American politician. Born in Abbeville, S. Carolina, March 18, 1782, of Scots-Irish descent, he graduated at Yale, 1804, studied law at Litchfield school of jurisprudence, and began to practise in 1807. His strong personality carried him into the state legislature, and in 1811 to congress, where he supported the measures which led to the American War of 1812 with Great Britain. Appointed secretary of war in President Monroe's cabinet in 1817, during eight years of office he reformed the administration of his department, reorganized the army, and improved the internal communications of the country. He was vice-president under John Quincy Adams, 1825-29, and under General Jackson, 1829-32.

The strongly protective tariff of 1828, which bore hard on agricultural interests, inspired his South Carolina Exposition, a defence of state rights. This document was extended in 1831 in an address to the people, in which he advocated a free-trade policy, and crystallised the theory of state rights. When in 1832 the state of S. Carolina passed a nullification ordinance, Calhoun broke with Jackson, resigned the vice-presidency, and entered the senate, where he became champion of the interests of the slave-holding states. He left the senate in 1844, becoming secretary of state under President Tyler, in which capacity he signed the treaty annexing Texas to the Union. In 1845 he resumed his place in the senate, and strenuously opposed war with Mexico in 1846-47. He defended slavery to the last, and in 1849 proposed a convention of the southern states. He died at Washington, D.C., March 30, 1850. *Consult* Life, C. M. Wiltse, 3 vols., 1944-51. *Pron.* cal-hoon.

Cali. City of W. Colombia, capital of the dept. of Valle. In the rich agricultural valley of the river Cauca, 3,330 ft. high, it is 65 m. by rly. S.E. of Buenaventura on the Pacific. Lying in a coal and iron region, Cali has a large transit trade. It was founded 1536 and has unique specimens of colonial architecture. The city suffered severely, with hundreds of casualties (including many killed) from an explosion of dynamite on Aug. 7, 1956. Pop. (1951) 284,186.

Caliari, PAOLO. Venetian painter known as Paolo Veronese (*q.v.*).

Caliban. Character in Shakespeare's comedy *The Tempest*. A half-savage creature, son of the witch Sycorax he is filled with

desire for vengeance against Prospero, who by superior magic has gained power in Caliban's island. His plot to murder Prospero is thwarted.

Calibration (Ital. *calibro*). Process of determining the bore, or calibre (*v.i.*), of a tube, or of graduating gauges so as to allow for irregularities. The process was originally applied to gauging the internal diameter, or calibre, of guns.

Calibre (Fr., probably ultimately from Latin *qua libra*, of what weight). Diameter in inches or millimetres of the interior of the bore of a rifle, pistol, or gun. In a rifled bore, the diameter is measured across the lands, except in a rib-rifled gun, which has relatively narrow grooves, when the calibre is the diameter of a cylinder which would just touch the bottom of all the grooves. The calibre of the projectile fired from a rifled firearm is the diameter across the greatest width of the projectile, excluding the driving band at its base. In smooth-bore cannon the calibre of the bore was always in proportion to the diameter of the projectile. A gun with a calibre of 5.29 ins. fired a round shot with a diameter of 5.04 ins. weighing 18 lb.; but a rifled gun requires a calibre of only 3.3 ins. to fire an 18½-lb. shell.

At one time a gun was designated by the weight and the shot it fired from its smooth-bore barrel, *e.g.* 24-pdr.; but nowadays calibre is used by artillerymen as a unit of measure, the length of bore bearing a definite relation to the calibre. Thus it is said that a 12-in. gun is 35 calibres, *i.e.* the bore is 35 ft. long, or 35 times the calibre. Calibre also governs the distinction between rifle and gun; a rifle becomes a gun when the calibre exceeds 8/10 in.

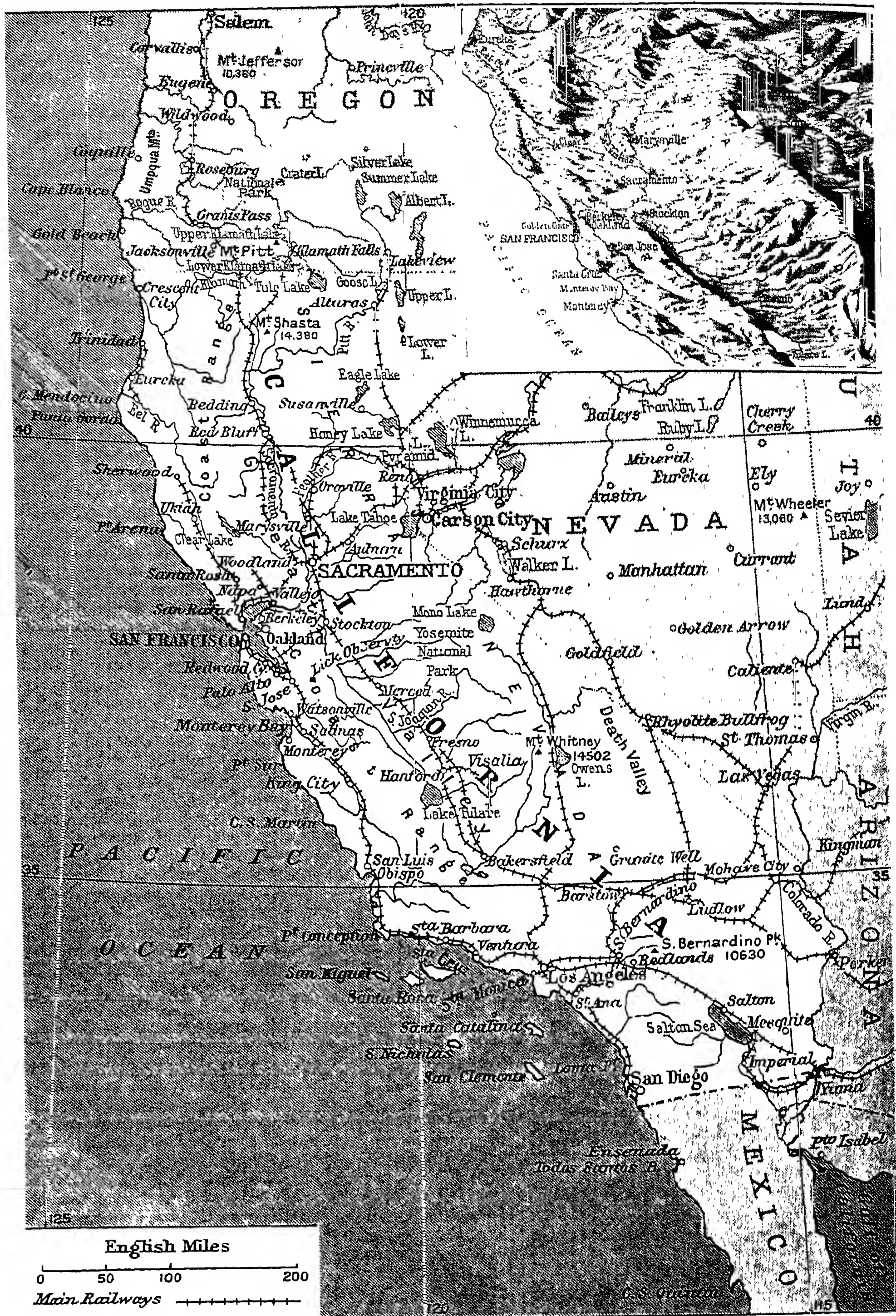
Caliche. Name given to impure sodium nitrate (NaNO_3) or Chile saltpetre. Deposits of this substance occur in N. Chile, the caliche beds of Tarapaca province being the most important. The strata of caliche, varying from a few inches to several feet in thickness, occur beneath layers of rock called *costra*. The *costra* are first removed, an excavation is made beneath the caliche, and it is loosened with a charge of gunpowder. The caliche is then removed to the *oficina* or works, where it is lixiviated with water and the sodium nitrate allowed to crystallise out. Good caliche contains 40-45 p.c. of sodium nitrate, but the content may fall to 10 p.c.

Chile saltpetre was almost the sole source of nitrate fertiliser until processes were developed for fixing atmospheric nitrogen.

Calico. General term for any plain weave undyed cotton cloth coarser than muslin. The word is derived from the once-famous cotton-weaving and printing city of Calicut, in India, which in the 16th century shared with Goa the carrying trade between India and Europe. Formerly any kind of cotton cloth imported from the East was called calico. Until 1733 calicoes had linen warps. In a charter of 1640 calico was listed among the linens as calico lawn, a grouping which led to the controversy, mentioned by Pepys in his Diary, between the East India Company, who insisted that calico was cotton, and the collectors of the additional duty, who said it was linen. The term calico is little used among manufacturers, but is common in the retail trade.

Calico Printing. Ornamentation of cotton fabrics by printing upon the cloth. It is carried out by means of hand-blocks, a slow and expensive process, or by engraved rollers and a machine. To a more limited extent a process akin to lithography has been employed. In direct printing the design is impressed upon cloth prepared by bleaching or dyeing, and the colour is then fixed on the cloth by steaming and the fabric finished. Machines are in use for printing in single colour and in multiple colours up to about sixteen, and duplex machines for printing both face and back of the fabric. In addition to direct printing there are the dyed, discharge, and resist methods. In the dyed method the cloth is printed with a mordant and afterwards dyed in a mordant dye, which dye is taken up only where the mordant has been printed. In the discharge method the cloth is first dyed, then printed with a chemical to discharge the colour and leave a white pattern on a dyed ground. In the resist method the cloth is printed with some chemical, then dyed, only those parts not printed taking up the dye.

Calicut. Seaport of India, h.q. of Malabar dist., Kerala, 6 m. N. of Beypur. It was a centre of Arab trade in the 13th century. The Portuguese explorer Pedro de Corvillão landed here, 1487, the first visit of a European to India, and was followed by Vasco da Gama in 1498. Then a flourishing city and a leading port, with fine houses and stately pagodas, Calicut twice drove off the Portuguese. The



CALIFORNIA: AMERICA'S GOLDEN STATE, WITH RELIEF MAP OF THE GREAT VALLEY

British, who first called here in 1615, established themselves firmly in 1792. A growing industrial town with cotton, soap, and perfume factories and electrical engineering works, it exports oil, coffee, and timber, and imports grain and salt. The calico which was made here, and took its name from the town, is no longer made. Pop. (1951) 158,724.

California. Maritime state of the U.S.A., second largest state of the Union. Area 158,693 sq. m. It has a coastline of 1,097 m. on the Pacific and embraces every variety of climate and topography to be found in N. America. It includes the highest point in the U.S.A., Mt. Whitney (14,502 ft.) in the Sierra Nevada, and the lowest, Death Valley, an arid region near the Nevada border, 280 ft. below sea level. Lassen Peak, in the Cascade range, is the only active volcano in the U.S.A.

The interior consists of the Great Valley, an area of 18,000 sq. m., enclosed by the Sierra Nevada mts. in the E., and the Coast range in the W. These mountain masses, effecting a junction both N. and S., traverse almost the entire state and include grand scenery, the Yosemite Valley especially. In the S. a smaller range stretches S.E. into Lower California, and attains a maximum elevation in San Bernardino peak (10,630 ft.).

Vast forests of conifers, oaks, and other trees shroud the mts. of the N.W., the cultivable area being confined generally to the Great Valley and the south. California experiences hot, dry summers (the world's record shade temperature of 134° F. occurred in 1913) and warm, wet winters on the lowlands, with severe winters at higher altitudes. Los Angeles, metropolis of S. California, resembles the Riviera. With a forest area of 24,761,504 acres, the largest in the U.S.A., California grows every variety of tree seen N. of the tropical zone. The state is renowned throughout the world for its 1,156,000 sequoia "big trees," some 40 ft. in diameter at their bases and older than the Pyramids. The southern cities use palm trees,

golden poppies (the state flower), and orange trees for street and garden adornment. Some 2,500 species of flora and 350 species of bird are found in the state.

Apart from the Sacramento and San Joaquin, with their main tributaries, there are few rivers navigable far. Irrigation is essential for crop-growing, the chief industry; in 1940 the irrigable area was 8,039,175 acres. The state has also half the flowing artesian wells in the U.S.A.

Oranges, lemons, olives, grapes, raisins, plums, prunes, peaches, cantaloupes, figs, apricots, pears, apples, walnuts, and almonds are grown in abundance. The state was also the first to grow sugar beet, and still leads in that industry. In 1940 the yield per acre of cotton was 723 lb. Maize, wheat, oats, and barley are cereals of first importance. The cooperative system is widely used in fruit-growing and marketing. The raising of dairy and beef cattle and sheep is an important industry. Fish include tuna, salmon, halibut, sole, mackerel, striped bass, rock cod, sardines, shrimps, and oysters.

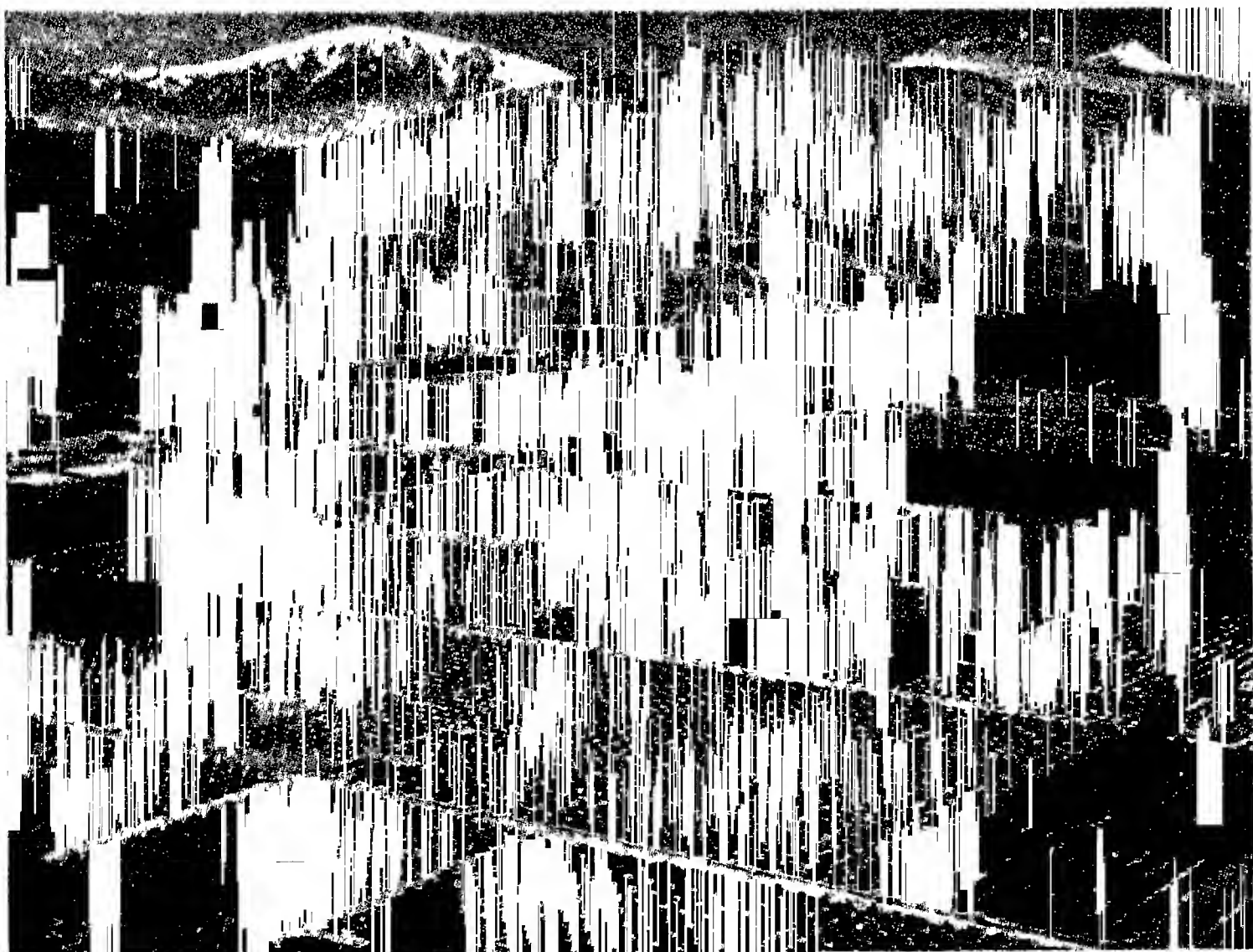
In the San Francisco market 133 varieties of fish are sold seasonally. Flower seeds and mustard are other important products.

California has prolific mineral resources, notably gold, in which she has far outstripped any other state since the "gold rush" of 1848. The total output to Jan. 1, 1941, was valued at approx.

£535,116,317. In 1940 she produced 1,408,700 oz., valued at £12,326,125. Other mineral products are silver, copper, lead, zinc, and quicksilver. Borax is found in large quantities, and the 50,000 acres of kelp, "sea alfalfa," produce potash, ammonia, and iodine. California produced 284,235,000 barrels of petroleum in 1943. She has approximately 14,000 producing wells, including the phenomenal Lake View, which spouts an average of 90,000 barrels a day.

During the Second Great War shipbuilding and aircraft industries expanded prodigiously, especially under Henry J. Kaiser (*q.v.*). Commerce is centred at San Francisco, which has one of the world's best natural harbours, and at Los Angeles. San Francisco has the largest Chinese colony outside Asia. Chinese immigration was restricted by law in 1879. The U.S. government passed a similar law in 1882, and revoked it in 1944, granting China an immigration quota like that of European nations. California still prohibits Chinese suffrage and the employment of Chinese on state projects and by state-chartered bodies.

The state was originally settled by the Spanish, whose influence is discernible in its place names and architecture; old Spanish missions survive as remnants of the influence of the Franciscan friars. All California was part of Mexico when that country achieved independence, 1822. It was seized by the



California. Vast plains that were once barren have been transformed by irrigation and scientific methods of cultivation, and now yield an immense harvest of semi-tropical fruits, such as oranges, lemons, olives, and grapes, as well as valuable vegetable crops

U.S.A. in 1845 and ceded by Mexico at the close of the Mexican War, joining the Union Sept. 9, 1850. It became a magnet for thousands of immigrants with the discovery of gold at Sutter's Mill in 1848. More than 42,000 crossed the plains, making a journey of 3,000 m.; others made the voyage round Cape Horn.

In 1845 the white pop. numbered 5,000. By 1940 it was 6,907,387; by 1950, 10,586,223. Rlys. link it with all other parts of the U.S.A. Educational institutions include the university of California (*q.v.*) at Berkeley, Leland Stanford university at Palo Alto, and the university of Southern California at Los Angeles. The Lick Observatory on Mt. Hamilton is part of the university of California. Other institutions for which the state is noted are Hollywood, the world-famous motion picture colony, a suburb of Los Angeles, and Alcatraz Island, in San Francisco Bay, site of the "escape-proof" prison where America's most desperate criminals are incarcerated. The state has frequently suffered from earthquakes, the most destructive of recent times being those of 1868, 1892, and 1906. Sacramento is the capital and San Francisco the chief seaport. Two senators and 30 representatives are sent to congress.

California, GULF OF. Long narrow arm of the Pacific. Separating Lower California peninsula from the mainland of Mexico, it is about 710 m. long and from 50 m. to 125 m. wide. Its coasts are irregular, forming many small bays, and it contains many islands. Deep at the S., and shallow to the N., it produces pearls, sponges, and coral.

California, LOWER (Sp. Baja California). Peninsula of Mexico. Extending for about 750 m. between the Pacific Ocean and the Gulf of California, it varies from 30 m. to 145 m. in breadth; area 55,636 sq. m. It is traversed by a mountain range, a continuation of the Sierra Nevada and Coast range, with summits reaching above 8,000 ft., and has an indented coastline. Spanish moss and sisal hemp are grown and, where the country is artificially irrigated, oranges, lemons, pineapples, maize, wheat, sugar, grapes, tobacco, and cotton. Pearl fishing, cattle raising, and fishing are carried on, and the land has rich mineral deposits including gold.

The peninsula is divided into the state of Lower California, admitted 1951 (formerly the territory of Baja California Norte, or North

Lower California), capital Mexicali, area 27,656 sq. m., pop. (1950) 226,965; and the territory of Baja California Sur (South Lower California), capital La Paz, area 27,980 sq. m., pop. (1950) 60,864.

California, UNIVERSITY OF. One of the leading educational institutions in the U.S.A., in point of endowment, enrolment, and quality and variety of instruction. The enrolment for 1940-41 was 34,475, including the largest group of full-time resident students in the U.S.A. The university, whose seat is at Berkeley, has seven major campuses and supplementary schools and research stations throughout the state. It includes the Lick Observatory on Mt. Hamilton, the Scripps institute of oceanography at La Jolla, and agricultural research centres. Its library contains over 2,000,000 volumes. In addition to colleges of arts and sciences there are schools and colleges of law, medicine, dentistry, pharmacy, and nursing.

Chartered 1868, it first used the facilities of the College of California, a private institution in Oakland. The first buildings at Berkeley were erected in 1873. In 1900 Phoebe Hearst (mother of the publisher, W. R. Hearst) sponsored an international contest to choose the architectural design for the buildings on the university's last campus, at Los Angeles. A Frenchman, Bernard, won with his plan for modified Italian Renaissance buildings of white granite.

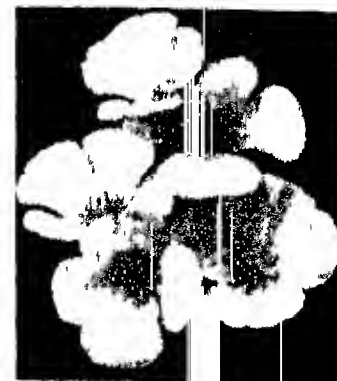
Californian Pitcher - plant (*Darlingtonia californica*). Herb of the family Sarraceniaceae. A native of California, its leaves take the form of erect trumpet-shaped tubes with a swollen hood at the upper extremity, on the underside of which, concealed by a large triangular expansion, is the opening to the "pitcher." These leaves are bright green with a network of



Californian Pitcher-plant

red lines and blotches of white on the upper parts. Insects find their way inside the hood, but in trying to get out again many are drowned in the clear liquid with which the pitcher is partly filled. Their decomposed bodies form nourishment for the plant.

Californian Poppy (*Eschscholtzia californica*). Perennial bushy herb of the family Papaveraceae. A



Californian poppy, North American perennial

native of N.W. America, it has bright yellow, four-petaled flowers, which are succeeded by long seed-pods like those of the horned poppy. The sepals are united to form an extinguisher-like

calyx which is pushed off unbroken by the expanding petals; and the leaves, finely divided, are of a glaucous green. In gardens it is treated as an annual.

Californium. Artificial radioactive element, symbol Cf, at. no. 98, at. wt. 244, first produced in 1950 at Berkeley, Calif., by bombarding curium-242 with α -particles. Half-life, about 45 mins.

Caligula (A.D. 12-41). Roman emperor, A.D. 37-41. The son of Germanicus and Agrippina, his real name was Gaius Caesar, Caligula being derived from the *caligae*, or soldiers' boots, which he wore as a boy with the army in Germany, where he was brought up.



Caligula, Roman emperor

The first few months of his reign promised well, but a serious illness left him a changed man. The rest of his reign is a record of extravagance, debauchery, cruelty, and caprice, which can scarcely be explained except on the supposition that he was insane. At one public entertainment, when annoyed with the populace, he expressed the wish that the Roman people had only one neck, which might be cut through with one blow.

On one occasion Caligula led an army to the N. coast of Gaul, as if for an invasion of Britain, and when it reached the sea-shore ordered the soldiers to pick up shells, to commemorate a supposed victory over the ocean. He made his horse, Incitatus, a consul, and proclaimed himself a god. At last a conspiracy was formed against the crazy tyrant, and he was murdered by Cassius Chaerea, tribune of a pretorian cohort. Great excitement was caused in Germany by the publication in 1894 of a pamphlet by L. Quidde, entitled *Caligula: a Study in Roman Imperial*

Madness, followed by Is Caligula comparable with our own Age?, the result of which was the author's trial for *lèse-majesté*.

Calinescu, ARMAND (d. 1939). Rumanian politician. A member of the National Peasant party, he became minister of the Interior in 1937 and minister of Health in the Cristea government of 1938. In the latter office he was entrusted with the task of suppressing the Iron Guard, the Rumanian fascist organization. He formed the party of National Regeneration on March 7, 1939, and became premier in the new cabinet. His fearless activity in suppressing the Iron Guard resulted in his assassination by members of that body on Sept. 21 1939.

Caliph AND **CALIPHATE** (Arab. *khalifah*, successor.) Caliph was the title given to the official head of Mahomedanism or Islam, who was regarded as the successor of the prophet; and caliphate was the title of his empire.

When Mahomet died (June 8, A.D. 632) his followers chose as the first caliph Abu Bekr (*q.v.*), the father of his favourite wife. The new faith had not yet advanced beyond Arabia. Directed by Abu Bekr, its captains now mastered Syria. This conquest was completed under the second and greatest of the caliphs, the true hero of Islam, Omar—to whom the succession passed in 634. The conquest of Syria was followed by the conquest of Persia. The attack upon Egypt began before Omar's death in 644; under his successor Othman the conquest of Egypt was completed, and the Mahomedan rule was further extended in Central Asia. When Othman, a son-in-law of the prophet, was assassinated in 656, the succession was disputed, one party claiming it for Ali (*q.v.*), cousin of Mahomet and husband of his daughter Fatima. From that time there has been always a sect or section of the Mahomedan world (called Shiites) who have denied the "orthodox" or Sunnite succession, claiming the supreme authority for the descendants of Ali, as being descended from the prophet himself.

A rival to Ali appeared in the person of Moawiya, a cousin of Othman, who, when Ali was murdered, procured his own recognition as caliph instead of Ali's son Hassan, and founded the Omniad dynasty of caliphs, with their headquarters at Damascus, in 661. In his days, the Mediterranean littoral of Africa was lost to Christianity, and the first unsuccessful attack was made on Constantinople.

Ali's second son, Husein, rose against Moawiya's successor Yezid, but was defeated and killed in battle. The active advance of Islam was renewed under Walid (705-15), when the Arabs poured into Spain and drove her Gothic rulers into the northern mountains. In the East the Muslim advance was hurled back by the emperor Leo the Isaurian before Constantinople in 718, and in the West by Charles Martel, at the battle of Tours, or Poitiers, in 732.

The Omniads had not been distinguished in character or ability; towards the middle of the 8th century new claimants arose in the descendants of Abbas, an uncle of Mahomet. A victory, followed by the treacherous massacre of the Omniads at a conference, transferred the caliphate in 750 to the Abbaside Abul Abbas.

The Abbases removed the headquarters of the caliphate from Damascus to Bagdad on the Tigris, which now rose to a sudden splendour. The most famous of the Abbaside caliphs is Haroun al Raschid. At this time the court of Bagdad was the wealthiest and most splendid in the world, and intellectually the most advanced and the most tolerant. But the fall of the Omniads had led to a disruption; one member of that family escaped to Spain, and set up the rival Omniad caliphate of the West at Cordova (786).

Wars and insurrections were rife under the Abbases; the Caliph Mutassem (833-42) sought security by creating an army, rather than a bodyguard, of Turks from Central Asia who had adopted Islam. From protectors, the Turks were not long in transforming themselves into masters, though they kept the Abbaside caliphs as heads of the Mahomedan religion. Yet a Shiite or Fatimide dynasty of caliphs was set up in Egypt, in the 10th century. The final overthrow of the Bagdad Caliphate was wrought by the Mongol Hulagu in 1258. But the Egyptian Mamelukes repelled the Mongol invasion; and the Fatimide caliphs having been set aside by the Seljuk Turks, the Mamelukes kept a puppet Abbaside caliph till the conquest of Egypt by the Ottomans in 1517, after which the succession was assumed by the Turkish sultans.

In Nov. 1922, it was announced that the office of caliph, hitherto vested in the person of the sultan, should be filled by election from among the princes of the House of Osman. Abdul-Medjid (b. 1868), cousin of the sultan, was elected. On Mar. 3, 1924, the National

Assembly at Angora (Ankara) decreed the abolition of the caliphate and the expulsion of Caliph Abdul-Medjid. See Abbasides; Mahomedanism, Turkey: History.

Bibliography. Annals of the Early Caliphate, W. Muir, 1883; The Caliphate, its Rise, Decline, and Fall, W. Muir, 1891; The Caliphate, T. W. Arnold, 1924.

Calisthenics OR **CALLISTHENICS** (Gr. *kalos*, beautiful; *sthenos*, strength). System of mild gymnastics for girls, often accompanied by music, for promoting health and grace of form and movement. Both the system and the word have gone out of use.

Calixtines (Lat. *calix*, chalice). Name first given in 1420 to those followers of John Hus in Bohemia who insisted on the cup or chalice being given to the laity at holy communion. They were also called Utraquists from their demand for communion in both kinds. By the 13th century the custom of the laity partaking of the chalice had become obsolete, theologians deciding that the benefit of the sacrament to the recipient was sufficient if one species, the bread, was received.

Although the council of Constance had declared communion in one kind sufficient, the Calixtines maintained their doctrine. Unlike the Taborites, the radical section of the Hussites, the Calixtines, whose chief leader was a priest, Rokyzana, held the Catholic doctrine of the Eucharist, and the Council of Basel, 1433, declared that communion in both kinds should be given to all who desired it in Bohemia and Moravia. The Council of Trent decided that the custom of reception in one kind had the force of law, but referred to Rome the particular case of the Calixtines, and Pope Pius IV in 1564 decided in their favour. The concession was, however, revoked the following year. The Calixtines ceased to exist as a separate organization after the Thirty Years' War. See Hus, John.

Calixtus I, more correctly **CALISTUS** (d. 223). Pope and martyr. Born a slave in the household of Carpophorus, he lost large sums of money entrusted to him and fled from Rome, embarking on a ship from Portus. Pursued by Carpophorus, he jumped overboard, but was captured and sent to grind at the hand-mill, and subsequently condemned by the Roman prefect to the mines in Sardinia. He was released with other Christians by order of Marcia, the mistress of Commodus, and Pope Victor granted him a monthly allowance. By Roman law having

ceased to be a slave when condemned by the state to penal servitude, he was placed in charge of the Christian cemetery still named after him by Pope Zephyrinus, whom he succeeded in 218. He was martyred in 223, and his festival is kept on Oct. 14. *Consult* Hippolytus and Callistus. J. J. I. von Dollinger, Eng. trans. 1876.

Calixtus II (d. 1124). Pope 1119-24. The son of William, count of Burgundy, he was elected to the papacy Feb., 1119, but the emperor Henry V set up an anti-pope, Gregory VIII. Moreover, he refused to confer with Calixtus on the question of investing bishops. With the aid of the Norman princes in South Italy, Calixtus drove the emperor's forces and allies from Rome in 1121. He then sent an embassy to the emperor, and in 1122 by the concordat of Worms the investiture controversy was settled.

Calixtus III (1378-1458). Pope 1455-58. Born near Valencia in Spain, Alonso de Borja (Borgia) was elected to the papacy in 1455. He took the name of Calixtus III, and devoted himself to the organization of Christendom against the invading Turks, but his efforts to reconcile conflicting interests in the face of a common danger failed. Under his direction the trial of Joan of Arc was revised, the sentence annulled, and her innocence declared. He made two of his nephews cardinals; one of whom, Roderigo Borgia, became pope as Alexander VI (*q.v.*). Calixtus died at Rome, Aug. 6, 1458.



Calixtus III,
Pope 1455-58
From a medal

Calixtus OR **CALLISEN**, GEORG (1586-1656). German Protestant theologian. Born at Medelbye in Slesvig, he was appointed professor of theology at Helmstedt in 1614. He was the author of an *Epitome of Moral Theology*, 1619, and other theological works. *Consult* Life of Calixtus, W. C. Dowding, 1864.

Call. (1) Term employed in company law to denote an amount which a company calls upon a member to pay on each share held by him. If the company is one with limited liability, a member can only be called upon to pay up to the nominal value of each share. Notice of calls must be given in accordance with the company's articles of association, and if the time mentioned in the notice expires and the shareholder has not

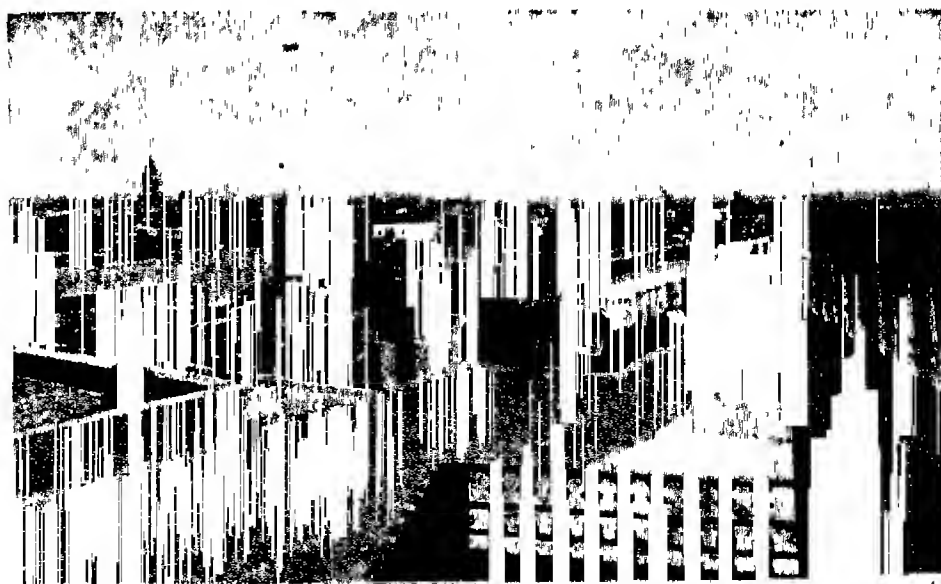
paid, the amount of the calls becomes a debt due to the company, which can sue for the same.

(2) Term used on the Stock Exchange. A call, or call option, is the right to buy a certain quantity of shares at a certain price within a certain time. A speculator pays for this privilege, and forfeits the money paid if he declines to call for the shares. The reverse process is called a put option.

Calla, MARSH (*Calla palustris*). Perennial aquatic herb of the family Araceae. A native of N. Europe and N. America, it has a fleshy creeping stem and heart-shaped leaves, with long stalks. The simple flowers, produced every other year, are arranged, like those of lords-and-ladies, around a spadix, the upper ones being male and the lower complete. The white spathe, or envelope, does not form a hood over them, but spreads out to one side. The flowers are succeeded by red berries. The rootstocks contain starch and can be made edible by dissipating its acridness.

Callander. Parish and police burgh of Perthshire, Scotland. On the river Teith, 3 m. below Loch Lubnaig, it is 16 m. by rly. N.W. of Stirling. Amid romantic scenery, near the Trossachs and the Falls of Bracklinn, it is a favourite tourist resort. Pop. (1951) parish, 2,382; burgh, 1,728.

Callao. Chief seaport and third city of Peru. On a bay sheltered by islands, 7 m. by rly. S.W. of Lima, it ranks third among Pacific ports, and vessels may discharge into lighters in the bay or enter the dock. It exports wool, hides, cotton, sugar, copper, silver, bark, nitre, and guano, and has sugar refineries, ironworks, and sawmills. The modern city lies just N. of the old city, which was raided by Drake in 1578 and

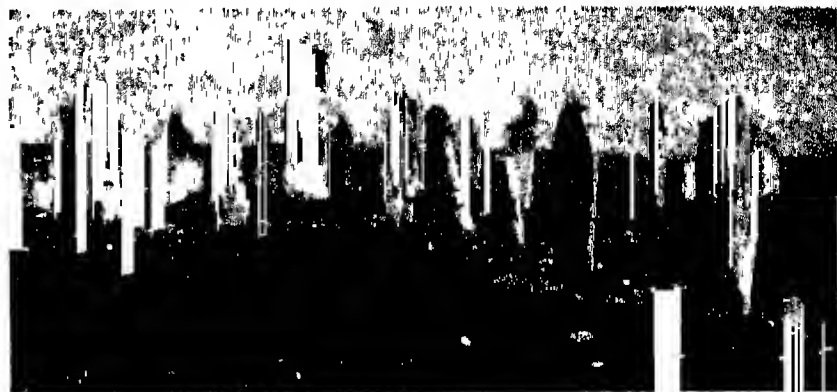


Callao, the chief seaport of Peru. View of the town built to replace old Callao, destroyed by earthquake

destroyed by earthquake in 1746. Here in 1820 Lord Cochrane took the Spanish frigate *Esmeralda*. Callao was bombarded in 1866 by the Spanish fleet, and in 1880 by the Chileans. Pop. (est.) 88,000. The prov. of Callao, created in 1836, has an area of 14 sq. m. Pop. 114,000.

Callas, MARIA MENEQHINI (b. 1923). An American-born Greek soprano. Born in New York, Dec. 3, 1923, when her family returned to Greece in 1936 she entered the Conservatory at Athens. In 1947 fame came to her overnight, when she sang the part of *Gioconda* at the open-air arena in Verona. In 1952 she made her debut at Covent Garden in *Norma*. She sang with equal success Wagnerian rôles and the florid bel canto of Bellini, Rossini, and Donizetti.

Callernish. Village W. of Stornoway, Lewis, remarkable for three Neolithic stone circles. The largest, 37½ ft. across, consists of 13 unhewn gneiss monoliths, with another, 17 ft. high, at the centre. Two stones of the circle lie on either side of the entrance to a chambered cairn



Callernish, Stornoway. Remains of the Neolithic period

21 ft. in diam. From the circle an avenue of standing stones runs northward for 270 ft.; single lines of stones running E., S., and W. complete the design of a cross.

Calleva Atrebatum. See under Silchester.

Callias. Name of a distinguished Athenian family, the members of which were torchbearers at the Eleusinian mysteries. (1) Callias.

His name is associated with a peace with Persia called the "peace of Cimon." The Athenians showed their dissatisfaction with Callias by impeaching and fining him. (2) Hipponicus, son of (1). His wife left him and married Pericles, and his daughter married

Alcibiades. He was killed at Delium, 424. (3) Callias, son of (2), concluded the "peace of Callias" with Sparta, 371.

Callicrates (5th century B.C.). Greek architect. He collaborated with Ictinus (*q.v.*) in designing the Parthenon at Athens, 447-438 B.C. He also designed the temple of Nike Apteros at Athens; and, possibly, a small temple on the Ilissos near Athens, and the temple of Apollo on Delos, 425 B.C.

Calligraphy (Gr. *kalós*, beautiful; *graphein*, to write). The art of beautiful handwriting. Good handwriting, which should be legible as well as beautiful, is based on proportional construction of letters, elegant shape of curves or of the angular forms, harmonious gradations of strokes, regular spacing of letters, words, and lines, resulting in the production of a fine pattern. In China calligraphy was associated with painting. It was held in esteem in ancient Egypt and ancient Rome, among the Maya, the Arabs, and in Europe from medieval times down to today. The first manuals were produced in Italy (Ludovico Arrighi, 1522, 1523; G. A. Tagliente, 1524; G. B. Palatino, 1544). In England, Jean de Beaulieu and John Baildon published *A Booke containing divers sortes of hands* in 1571. *Consult Writing, Illuminating, and Lettering*, E. Johnson, 1906; *A Book of Scripts*, A. Fairbank, 1949.

Callimachus (c. 300-240 B.C.). Greek poet, grammarian, historian, and critic. Born at Cyrene, he spent most of his life in Alexandria, where Ptolemy Philadelphus appointed him superintendent of the library, a post which he held until his death. He is said to have written more than 800 works in prose and verse. Of his poems, the *Aitia* (causes) related the mythical origin of cities, festivals, manners, and customs; the *Hecale*, the story of the kindly reception of Theseus by an old woman.

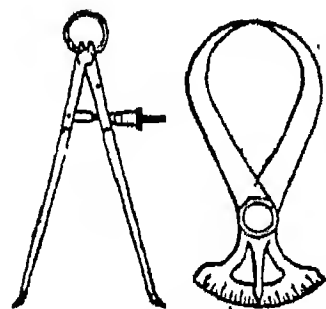
Fragments discovered in Egypt at Oxyrhynchus included the greater part of the charming love story of Acontius and Cydippē (from the *Aitia*), preserved in Ovid's *Heroides* (epistles).

Calling Crab (*Gelasimus*). A tropical crustacean of the order Decapoda, which burrows in the mud or sand of the seashore and can often be seen in large numbers at low tide. The males have one of their pincers (chela) tremendously enlarged, sometimes to such an extent that the pincer is larger than the animal's body. The crab

uses it as a weapon, and, since it is also brilliantly coloured, the pincer plays an important rôle in courtship, in the course of which it is waved about as if beckoning, hence the crab's popular name.

Calliope (Gr., beautiful-voiced). In Greek mythology, one of the nine Muses. She had charge of eloquence and heroic poetry, and is represented with wax tablets and holding a stylus. *Pron.* cal-li-o-pee.

Callipers. Instrument with two legs or jaws for determining the inside or outside dimensions of shafts, rods, cylinders, etc. The diagram shows (left) spring callipers with screw adjustment, for measuring internal diameters; and (right), firm-joint callipers for taking external dimensions, with an index working on a sector to indicate the amount the legs have been opened. Sliding callipers comprise a graduated steel stock having one jaw formed integral with it, and a second, sliding jaw which can be moved along the stock to a given dimension. *See also* Vernier.



Callipers. Left, for measuring inside, and right, for exterior, dimensions

Callisthenes (c. 360-328 B.C.). Greek philosopher. A fellow pupil of Alexander the Great in the school of Aristotle, whose relative he was, he accompanied the emperor as adviser into Asia, but was executed at Alexander's order for opposing the latter's apotheosis.

Callisto. In Greek mythology, an Arcadian nymph and companion of Artemis (*q.v.*), beloved by Zeus. To conceal his intrigue from his wife Hera, Zeus turned Callisto into a she-bear, in which form Artemis, at the instigation of Hera, unwittingly slew her. She was then placed by Zeus in the constellation Arctos, the Bear.

Callistratus (d. 356 B.C.). Athenian orator and politician. His eloquence is said to have inspired Demosthenes to take up public speaking. Driven into exile in consequence of his policy in regard to Oropus, he returned without permission, and was put to death.

Callitrichaceae. A family of small aquatic herbs consisting of one genus, *Callitriche*. They have thin stems, linear leaves, and inconspicuous flowers with one stamen or four-celled ovary. Water starworts belong to this family.

Callosity (Lat. *callositas*, hardness of skin). The result of local mechanical irritation. A corn may

develop from a callosity. A callosity is mostly seen on the ball of the foot, or on the palm of the hand in manual workers.

Callot, JACQUES (1592-1635). French engraver, one of the first great artists to confine himself to engraving.



Jacques Callot, French engraver

Born at Nancy, the son of the herald at arms to the court of Lorraine, when he was 16 he went to Rome, where he learned engraving under Tempesta and Thomassin. He lived in Florence during 1611-21, engraving in line after del Sarto and other painters. Most of his etchings were from his own drawings; they show brilliant imaginative insight and variety of style. Many of them were done with hard varnish, a method of his own invention, which made possible a lightness of atmosphere new to the medium. Back in Lorraine, he spent his last years engraving chiefly religious works. His masterpiece is *Les Grandes Misères de la Guerre*, 1663. He died at Nancy March 24, 1635.

Callus (Lat., hard skin). Medical term for new bone which is formed between and around the fractured ends of a broken bone, uniting the separated portions.

Calmar. *See* Kalmar.

Calmette, GASTON (1858-1914). French journalist. Born at Montpellier, he was attached to *Le Figaro* for many years before he became its editor-in-chief in 1903. In Jan., 1914, he began a series of attacks in his newspaper on Joseph Caillaux (*q.v.*), minister of finance, charging him with fraud and corruption. Following publication of a damaging private letter written by Caillaux, Mme. Caillaux visited Calmette at his office in Paris on March 16 and shot him. He died next morning.

Calne. Borough and market town of Wiltshire, England. It lies 6 m. S.E. of Chippenham in the valley of the little river Marden (or Calne). The chief buildings are the fine church of S. Mary, the town hall, the 17th-century grammar school, S. Mary's boarding school for girls, and other schools. Bacon-curing is the chief industry. Calne returned two members to parliament until 1832, and one until 1835. Pop. (1951) 5,553.

Calomarde, FRANCISCO TADEO (1773-1842). Spanish politician. Born at Villel, Aragon, he was

educated at Saragossa and became a lawyer. Having entered political life, he obtained a position on the return of the Bourbons in 1814, and ten years later he became minister of justice. He was prominent in the discussion over the succession to the throne, since Ferdinand VII had no sons. Having pledged himself to support Don Carlos, Ferdinand's brother, he vainly tried to secure the exclusion of Isabella, Ferdinand's daughter, and in 1833 left the country. He died at Toulouse.

Calomel (Gr. *kalos*, beautiful; *melas*, black). Mercurous chloride, or subchloride of mercury, HgCl . It is used in medicine, in doses of $\frac{1}{2}$ to 3 grains, as an irritant under alkaline conditions in the intestine.

Calonne, CHARLES ALEXANDRE DE (1734–1802). French politician and financier. Born of good family at Douai, Jan. 20, 1734, he became a lawyer. As procureur of the parlement of Douai and intendant of Lille from 1774, he gained a reputation for business capacity, and was appointed controller-general in 1783 after Necker's fall. His suggestion that the nobles and clergy should be taxed made him unpopular at court, and in April, 1787, Monsieur Deficit, as he was nicknamed, was dismissed. He made his home chiefly in London until Napoleon allowed him to return in 1802. He died Oct. 30 of that year.



Charles de Calonne,
French politician
After Mauraisse

Caloric. Term to describe an early theory of the principles or cause of heat. Until about 1850 there were two long-established theories as to the nature of heat: one ascribed it to the energy or "motion" of the ultimate particles of matter; the other presupposed an imponderable, fluid-like substance called caloric associated with matter and shifting from hot to cold bodies when they were brought together. Neither theory had any experimental basis until the second half of the 18th century when, among others, Joseph Black started to measure specific heats and latent heats, with results that tended to support the caloric theory. Its refutation dates from experiments by Benjamin Thompson (Count Rumford) in 1798 and Humphry Davy in 1799. Davy's work seemed particularly convincing, as he showed that two

pieces of ice (after being insulated) could be melted by rubbing them together. It was known that caloric was required in order to melt ice but in this experiment there was nowhere it could come from—unless it were admitted that the work (or energy) of rubbing could create caloric. The caloric theory was finally discredited in the mid-19th century by Joule's work on the energy equivalents of heat and by the acceptance of the atomic theory of matter. The proving of the energetic theory of heat was one of the great achievements of 19th-century physical science.

Calorie. Metric unit quantity of heat in the C.G.S. system. It is defined as the amount of heat necessary to raise 1 gram of water from 14°C . to 15°C . For some purposes it is more convenient to use the kilocalorie or large Calorie, which is always spelled with a capital "C" and is equivalent to 1,000 small calories. The mean calorie is $1/100$ of the quantity of heat required to raise 1 gm. of water from 0°C . to 100°C . The small calorie is equivalent to $4.2^{\circ} \times 10^7$ ergs.

Calorific value is represented by the number of units of heat which the complete combustion of unit weight of the fuel will evolve. Thus it has an important bearing on the use of fuel in industry. In the U.K. the calorific value of fuel is generally measured by the number of British thermal units (B.Th.U.) generated by the combustion of one lb. of the fuel. The B.Th.U. is the amount of heat required to raise one lb. of water from 60°F . to 61°F . One B.Th.U. equals 252 calories.

The caloric value of a fuel can be calculated approximately from its chemical composition, but is best determined experimentally by means of a calorimeter (*q.v.*).

A calorie is also the unit by which the ability of food to supply warmth and energy is measured: 2,400 a day are necessary to maintain normal health without exertion. For heavy work half as much again is needed. 1 gm. fat = 9.3 calories; 1 gm. carbohydrate = 4.1; 1 gm. protein = 4.1; 1 gm. alcohol = 7 calories.

Calorifier. Name usually given to cylinders designed to heat water by the passage of either live or exhaust steam through a battery of internal pipe coils. Automatic control of the steam flow, and full condensation of the steam before it leaves the calorifier, ensure that all the latent heat of the steam is utilised in heating the water.

Calorimeter (Lat. *calor*, heat; Gr. *metron*, measure). Device for measuring heat in calories (*see* Calorie). A simple calorimeter consists of a vessel containing a known quantity of liquid, usually water, a thermometer, and a stirrer. When a hot body is placed in the water, the amount of heat it contains can be found from the rise of temperature of the liquid in the following way:

Suppose m_b , m_l , and m_c are the masses of the body, the liquid, and the calorimeter respectively, s_b , s_l , and s_c , are their specific heats and

t_b , t_i , and t_f are the temperature of the hot body and the initial and final temperatures of the liquid plus the calorimeter respectively. Then, before mixture:

Total heat in body =

$$m_b s_b t_b = H_b \text{ (say)}$$

Total heat in liquid and calorimeter =

$$(m_l s_l + m_c s_c) t_i = H_c$$

After mixture:

Total heat =

$$(m_b s_b + m_l s_l + m_c s_c) t_f = H_f$$

Then, if no heat is lost or gained during the experiment,

$$H_b + H_c = H_f$$

which is the fundamental equation of calorimetry.

This particular form of calorimetry is known as the *method of mixtures*. For high temperatures a metal block is sometimes substituted for the liquid.

The difficulty common to all calorimetric methods is heat loss. This is reduced to a minimum by surrounding the calorimeter with a water jacket, supporting it on knife edges, and arranging that the change of temperature during the experiment is as small as possible consistent with accuracy. When working to very high precision *adiabatic calorimeters* are sometimes used in which the temperature of the enclosure surrounding the calorimeter proper is automatically maintained at the same value as that of the calorimeter, thus eliminating all heat loss. To obviate errors introduced during the transfer of the hot body to the calorimeter, electrical heating is often used instead of the method of mixtures. Electrical power, which can be measured very accurately, is supplied to a heating coil in the calorimeter and the total heat introduced thus determined.

A *bomb calorimeter* is used to find the heat evolved by a body during combustion. This is a strong steel bottle closed by a screw stopper and containing a crucible with an

electrical ignition system. A steel membrane is sometimes incorporated, the distortion of which enables the internal pressure to be determined. The bomb is placed in a conventional liquid calorimeter and the sample ignited. The experiment then proceeds as in the method of mixtures.

For measuring the specific heats of liquids *continuous flow* or *continuous mixture calorimeters* are used. Both these use steady streams of liquids and there is no change of temperature in the apparatus during the experiment. Other types include *ice* and *steam calorimeters* which rely on the absorption of heat during change of state and *calorimeter rooms* which are large insulated enclosures in which the total heat input and output can be continuously measured to determine the efficiency of domestic heating apparatus.

Calorising. Process for treating iron and steel components to provide a heat-resisting surface. The parts are heated in stationary or rotary retorts to about 1,000° C., in contact with aluminium dust. This forms a surface layer of relatively pure aluminium which is strongly resistant to oxidation and to attack by sulphurous atmospheres. Calorised steel is used for carburising boxes, pyrometer sheaths, and the tubes of pre-heaters.

Calotte, RÉGIMENT DE LA (Fr., regiment of the skull-cap). Mock institution founded in 1702 by a handful of young officers at the French court in protest against the dullness of life at Versailles under the influence of Madame de Maintenon. One of them, having a racking headache, said he was going mad and felt as if he had a skull-cap of lead. His companions came to the conclusion that if all those wearing such a *calotte* were called together there would be enough of them to form a regiment. The *calottistes* regarded themselves as under the protection of Momus, god of ridicule. They made fun of the highest personages—even Louis XV himself. Each was awarded a patent revealing the worst of his character and of his life. Towards the end of the 18th century the regiment was converted into a kind of unofficial tribunal which judged matters of honour between officers. It was suppressed at the Revolution as being too aristocratic.

Caloyer (Gr. *kalogēros*, good old man). Term used generally for a monk of the Greek Orient, but

applied specially to the monks of Mount Athos.

Calpe. Ancient name for a hilly headland in S. Spain—the modern Gibraltar, known to the Greeks and Romans as Calpe. With Abyla, on the African coast, it formed the Pillars of Hercules.

Calpurnia. Fourth and last wife of Julius Caesar. She is said to have had a dream on the night before the fatal Ides of March and to have begged her husband to abstain from taking part in the celebrations, lest harm should come to him. The story is used by Shakespeare in Julius Caesar.

Calpurnius Siculus. Roman poet who lived in the time of Nero. He supposedly wrote eleven pastorals in imitation of Theocritus and Virgil, four of which are now generally ascribed to Nemesianus (3rd century A.D.).

Calshot. Small promontory of Hampshire, England, on the W. shore of Southampton Water, at its junction with the Solent. On it are the ruins of a castle built by Henry VIII with materials obtained from Netley Abbey. In 1912 a seaplane flying-school was established at Calshot, where the first experiments in the launching of torpedoes from aircraft and in the catapulting of aircraft from ships were made. The high-speed flights competing for the Schneider Trophy (*q.v.*) were based there.

Calstock. Parish and town of Cornwall, England. It is on the river Tamar, 9 m. N.N.W. of Plymouth by the railway. Copper and tin are mined, and wolfram is worked; brewing and tanning are other industries.

Caltagirone. Ancient city of Sicily, in the prov. of Catania. It is 36 m. direct and 55 by rly. S.W. of Catania. On two hills (alt. 2,000 ft.) joined by a bridge, it is the seat of a bishop, has fine buildings, and is a favourite place of residence for the Sicilian nobility. It makes pottery; stone is quarried and sulphur mined near by. There are Greek, Roman, and Saracenic remains. Pop. (1951) 43,931.

Caltanissetta. Prov. of south-central Sicily. Mountainous in the N., where it rises to over 3,000 ft., and watered by the Salso, it produces sulphur, salt, cereals, and fruit. Area 813 sq. m. Pop. (1951) 293,371.

Caltanissetta. City of Sicily, the capital of the prov. of Caltanissetta. It stands near the Salso, 1,940 ft. high, 43 m. by rly. N.E. of Agrigento. Of Saracenic origin, it is the seat of a bishop and has a

cathedral, the nave and aisle of which were damaged in the Second Great War; also a castle, a royal mining school, extensive sulphur-works, mineral springs, and potteries. In the neighbourhood is the Norman abbey of Santo Spirito, founded by King Roger in 1153. Pop. (1951) 60,515.

Calthrop, DION CLAYTON (1878–1937). English author and dramatist. A grandson of Dion Boucicault (*q.v.*), he was born May 2, 1878, educated at St. Paul's School, and studied art in Paris. His whimsical imagination was displayed in *Guide to Fairyland*, 1905; *The Harlequin Set*, 1911; *Bread and Butterflies*, 1914; *A Bit at a Time*, 1920; *My Own Trumpet*, 1935. For the theatre he wrote (with Harry Graham) *A Southern Maid*, 1920, and *Out to Win* (with Roland Pertwee), 1921. An authority on the history of costume, his *English Costume*, 1906, remained a standard work. He died March 7 or 8, 1937.

His brother, Donald Calthrop (1888–1940), was a stage and film actor. Born April 11, 1888, he first appeared on the stage in 1906 and in 1920 entered theatrical management. He made his first film 1919. He died July 15, 1940.

Calton Hill. Hill in Edinburgh, Scotland. At the E. end of the city, it is 355 ft. high and commands extensive views of Edinburgh and the country beyond. On the summit are two observatories and several monuments; one is an unfinished reproduction of the Parthenon at Athens and was begun as a national memorial to the Scottish troops killed in the Peninsular War and at Waterloo. A monument to Nelson has on its flagstaff a time-ball signal electrically connected with the one o'clock gun fired daily from Edinburgh Castle.

Caltrop (Lat. *calx*, heel; trap). Name given to the four-spiked iron balls scattered on the ground in medieval warfare to impede the enemy's advance. Their use was revived by the New England colonists against the Indians. The term is also applied to various thistles and other plants and to the tetract or four-winged spicule of sponges. Other forms of the word are calthrop and caltrap.

Calumba-root (*Jateorhiza palmata*). Perennial plant of the family Menispermaceae. A native of tropical Africa, it has annual stems and thin three-lobed leaves; the small flowers have pale-green concave petals, and are either male or female. The perennial part of the

plant consists of a bundle of spindle-shaped tubers, like those of the dahlia. These are the Calumbas—roots used in medicine as a bitter tonic in cases of indigestion and debility of the stomach.

Calumet (Lat. *calamus*, reed). Ceremonial pipe of the N. American Indians. The name originated



Calumet. N. American Indian pipe decorated with eagle feathers

in the 17th century with the French Canadians. The Dakota red pipe-stone was reserved for pipe-bowls. Red and white eagle feathers distinguished the war and the peace pipes. They were smoked at tribal councils, and when treaties with the white colonists were made.

Calumpit. Town of Luzon, Philippine Republic, in the prov. of Bulacán. It is about 26 m. by rly. N.W. of Manila, on the Pampanga river, crossed here by one of the longest bridges in the archipelago. Calumpit is a great mart for rice, and trades also in sugar and maize. In 1899 the chief buildings were burnt by the insurgents. Pop. (1948) 21,788.

Calvados. Department of N.W. France. In Normandy, it borders on the English Channel, where are the rocks from which it obtains its name, and has an area of 2,197 sq. m. The surface is hilly and wooded, especially in the northern district called the Bocage, but the soil is fertile. Horses, cattle, sheep, and poultry are reared in great numbers, and eggs, butter, etc., are exported. Wheat, oats, and barley are grown, also apples for making cider, while the lobster, mackerel, and herring fisheries are important. Caen is the chief town. Pop. (1954) 442,991. The battles of June–July, 1944, are described under Caen; D-day; Europe, W., Its Liberation; Falaise, etc.

Calvary, MOUNT (late Lat. *calvaria*, skull; Aram. *gulgotta*). Place of the Crucifixion of Jesus Christ. Four explanations are offered for the name: (1) it was a place of execution; (2) it adjoined a burial ground; (3) the small hill resembled a skull in its contour; (4) Adam's skull was buried here.

The first has the widest support; but the fourth was a popular Jewish tradition, and it survives in the skull and crossbones often

placed at the foot of a crucifix. The present Calvary Chapel at Jerusalem is part of the Church of the Holy Sepulchre, and stands on the site of the first chapel erected in the 5th century. Tradition declares this to be the site of the Crucifixion. The strength of the tradition and archaeological investigation support the claim, but until the precise course of the North wall at the time of the Crucifixion is determined some uncertainty must remain. It is quite clear from Heb. 13, v. 12 that Calvary was "without the gate."

Calvé, (ROSA) EMMA (1864–1942). French operatic singer. Born at Decazeville, Aug. 15, 1858, the daughter of a civil engineer, she studied under Laborde and Marchesi, and made her début at the Théâtre de la Monnaie, Brussels, in 1882, as Marguerite in Gounod's Faust. After achieving success in Paris and visiting the principal cities of Italy she sang for the first time at Covent Garden in 1892 as Santuzza in Cavalleria Rusticana. Her success in Europe was repeated in the U.S.A. Her interpretation of Carmen surpassed that of all previous performers, and she appeared to advantage also in L'Amico Fritz, Les Pêcheurs de Perles, and Sappho. She died Jan. 6 1942.

Calverley, CHARLES STUART (1831–84). British poet. Born at Martley, Worcestershire, Dec. 22, 1831, son of the Rev. Henry Blayds, who resumed the old family name of Calverley in 1852, he was educated at Harrow, spent a year at Balliol College, Oxford, where he won the Chancellor's prize for a Latin poem, and entered Christ's College, Cambridge, in 1852. After winning the Craven scholarship and numerous university prizes,

Calverley was elected a fellow of Christ's in 1858, and in 1865 was called to the bar at the Inner Temple. In the winter of 1866–67 an accident while skating compelled the



Emma Calvé as Carmen

gradual abandonment of all professional work. He died on Feb. 17, 1884, and is buried in Folkestone cemetery.

Calverley was a master of parody, and in his day the greatest writer of light verse. In 1862 he published Verses and Translations, in 1866 Translations into English and Latin, in 1869 a translation of Theocritus, and in 1872 Fly Leaves. The last named contains the famous examination paper on The Pickwick Papers, set at Cambridge in 1857, in which Walter Besant and W. W. Skeat were the prize-winners. His Literary Remains, 1885, contains a biographical sketch by W. J. Sendall.

Calves Head Club. A club founded about 1650 by those who approved of the execution of Charles I. The heads of calves, served at the club dinners, were supposed to represent the adherents to the Stuart cause. A meeting was usually held on Jan. 30, the anniversary of the king's death, the various dishes carrying allusions to the king and his faults, among these being a pike and a boar to represent tyranny and voracity. The regicides were toasted. After 1660 the meetings were perforce held in secret, and it is doubtful if the club long survived the Restoration. A club with this name also existed 1734–5. The secret history of the original club is given in a tract by Benjamin Bridgwater, reprinted in the Harleian Miscellany.

Calvi. Fortified seaport of Corsica. It stands on Calvi Bay, 44 m. N. of Ajaccio. The nearest Corsican port to France, Calvi contains the old palace of the Genoese governor, and other historical remains, and trades in wine, oil, fruit, and timber. At the capture of the citadel by the British in 1794, Nelson lost an eye; Calvi was recaptured in the following year. Pop. (1954) 2,035.

A commune of Italy, the ancient Cales, is called Calvi Risorta. It is in the province of Caserta, 8 m. N.W. of Capua, is an episcopal see, and has an old cathedral and an amphitheatre. Its vine (*vinum Calenum*) received the praise of Horace. Pop. (1951) 4,739.

Calvin, JOHN (1509–64). French Protestant theologian. He was born at Noyon, in Picardy, July 10, 1509. His family was of fair social position, and he himself was destined for the church and sent to Paris University in 1523. From the beginning of his academic life he showed strong intellectual powers. His nickname of "the accusative case"—*Calvinus accusativus*—apparently meant Calvin who stops (i.e. to think), but this is dubious.

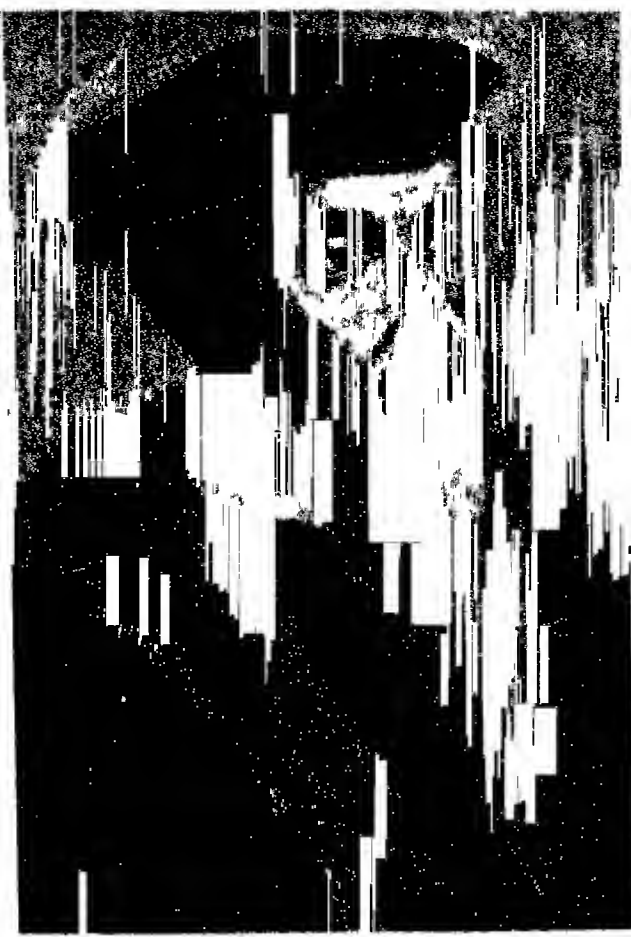
C. Calverley

When he was about 18, his father, owing to a quarrel with the clergy of Noyon, resolved to make him a lawyer instead of a priest, and sent him to the great law school at Orleans, where he pursued his studies with intense diligence and produced his first book—an edition of Seneca's *De Clementia*, 1532. The change in his career was probably not unwelcome to young Calvin, who, at this time, had distinctly Protestant leanings. About 1532 what he called his conversion took place. His reserved nature—so different from Luther's—was reticent about this experience, but he tells in letters that it was "suddenly" that the light disclosed to him his errors and sins, and he found refuge "in the compassion of God offered to him in Christ."

By 1533 he was an avowed Protestant, and almost immediately he was recognized as an adviser and leader even though he called himself but a "novice." He returned to Paris, but had to leave it on account of his evangelical views; and in 1535 he settled in Basel. Here he wrote his great theological treatise, *Christianae Religionis Institutio*, 1536. Whatever view be taken of the theology of Calvin, this work is a masterpiece of sustained thinking and of style and exposition; and its production at the age of 27 is astonishing. Few books, written at so comparatively early an age, have had such immense influence.

Calvin's activities entered a new sphere when, in 1536, at the earnest entreaty of Farrel, he laid aside his plans for a life of study, and went to Geneva. The situation there was difficult. Geneva supported the Reformation in the sense of being in revolt against Rome, but there was little real acceptance of the evangelical faith and no eagerness for any real moral reform. Calvin's personality brought about a crisis. He did not merely teach, but set up a new moral code in the name of church discipline, and attached civil penalties to its non-observance. There was nothing new in the civil power thus enforcing morals, but the Genevans would not have it, and within two years Calvin and Farrel were expelled from the city. Calvin settled in Strasbourg, where he studied and lectured and became a tower of strength to all the evangelical churches. He also came in contact with the German Reformation, and was one of the signatories of the Augsburg Confession. At Strasbourg he married Idelette de Bure, who died in 1549.

Meanwhile things were not going well in Geneva, and in 1541 the



John Calvin

From an engraving by Danckerts

Reformer was recalled. He hesitated, but the municipality, clergy, and people all entreated him to return and he consented. He came on his own terms. He was resolved that Geneva should be a "city of God." He saw that religion was not only for the individual, but also for the social life of the community, and that God's word was a law for church and state alike. He made public righteousness and social reform a real part of the Christian programme. But in the working out of these ideas he created great difficulties. He carried discipline too far, and did not see that, when carried too far, it defeats its own end. His system was too ecclesiastical and evoked political jealousies. And his use of the powers and penalties of the state to enforce spiritual and moral discipline was disastrous. In this last mistake, Calvin is not peculiarly to be blamed. He was in this only not above his age—just as he was not above it in the burning of Servetus, the unitarian. Yet, with all these faults, he did great things for Geneva. He undoubtedly made a new city morally. He developed its trade, improved its health, reduced its poverty; and it must not be forgotten that he founded its university. His influence beyond Geneva all over Reformed Christendom was incalculable. He gave Protestantism an organized system of doctrine and polity which proved of immense value to it in the testing times which succeeded the Reformation. The most valuable of Calvin's writings, apart from his *Institutio*, are his commentaries on books of Scripture. He died in Geneva, May 27, 1564.

Calvin's character has had less

than justice done to it. Whether or not some of his doctrines are harsh and gloomy, he himself was not merely the stern fanatic, but was by nature sympathetic. He possessed a real sense of truth and had not Luther's prejudices, but could be fair to opponents. He had a trained mind, which Luther had not. He thought on and thought out. His theological and political principles may be regarded as right or wrong but they are always *principles*, and Calvin never got into difficulties as Luther did. It may be too much to say of him, as Renan does, that he was "the most Christian man of his time"; but certainly he was one of its sincerest seekers for truth and its most earnest strivers after righteousness, as he conceived truth and righteousness to have been given to men in God's word. See Calvinism.

P. Carnegie Simpson

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Calvinia. Chief town of a N.W. district of Cape Province, S. Africa, also called Calvinia. The town is the terminus of the line from Hutchinson, 253 m. to the E., on the main Cape Town-De Aar rly. Sheep farming is the main industry of the district, which is mountainous in the S. and W., and some wheat is grown. The mean annual rainfall is 8 ins. Pop. (1951) town, 3,627, of whom 1,480 were white.

Calvinism. Theological doctrine derived mainly from the teaching of John Calvin. The name of John Calvin is intimately associated with a specific type or system of doctrine, yet he was really much less of the mere speculative theologian than many other Christian doctors. His aim in his great work, *Christianae Religionis Institutio*, 1536, is practical, and it contains hardly any purely speculative or *a priori* discussion of theological problems. His method is not philosophical as much as expository. Two things he seeks to expound—one the teaching of the Scriptures, the other the facts of religious experience. This is true of even his most characteristic positions.

Nothing is more associated with Calvin—though it may equally be associated with Augustine—than the doctrine of predestination. He does not reach this by speculation about God and free-will or determinism; he does not even reach it

till he discusses salvation and finds, from the data of religious experience, that it is God alone Who saves. This is characteristic of Calvin all through. And it is this which is the basis of his positiveness of assertion. This positiveness, which offends many, is not that of the self-confidence of a small mind; it is not a confidence in himself at all. It is because he bases all he says on what he believes he finds in Scripture and experience, but when his theme leads him beyond this, as in the discussion of the nature of the Trinity, he is not dogmatic.

Calvin's System

Calvin's work is systematic for two reasons. One is that he had an orderly and logical mind and could arrange truth with exceptional lucidity and force. The other is that he had one central dominating conception to which everything is related. If it be asked what that conception is, the only answer that can be given is the conception of God. Calvinism is a system that relates everything in theology to a dependence upon God. To make any such doctrine as Predestination the characteristic note of Calvinism is entirely to fail to appreciate the man and the system. Predestination is but an example of the general principle. It is simply applying the conception of the dependence of everything upon God to the particular instance of man's salvation.

It is necessary to make this clear, for Calvinism has been far too much associated with one dark and difficult speculative doctrine. This is an injustice to Calvin himself, and it arose after his time, when, controversy having arisen with the Arminian type of theology, the Synod of Dort emphasised certain points in Calvin out of all due proportion to the whole. The points thus emphasised were five—Predestination, Irresistible Grace, Original Sin, Particular Redemption, and Perseverance. These are not doctrines particular to Calvin. Other Reformers, such as Luther and Zwingli, stated them even less guardedly than he did; while of course Augustine has them. But in the circumstances indicated they have become characteristic of what is called Calvinism, which, in the general mind, has come to stand for, in particular, Predestination with, as its corollary, the Sovereignty of God.

Doctrine of Predestination

As already pointed out, Calvin did not reach the doctrine of Predestination by metaphysical speculation. He reached it in the course of discussing salvation, by asking "Whence is this new life?" He

answered, "It is of God and God only." No other answer is possible to the religious mind. This is Calvin's—as it was Augustine's—first principle. The difficulties arise when *deductions* are drawn from this. It is easy to shirk these deductions, but Calvin, with his French lucidity and logic, would not consent to that. If a truth has consequences he would take them. And the first consequence is this. I find my salvation is wholly of God and His grace. The ultimate source of my (or any man's) salvation is the will of God to do it. But I see that not all men are saved. This can only mean that God has not willed to save them. That is the only conclusion. Calvin feels its darkness, but he will not shirk it. He states the doctrine of a limited election to life, and even of reprobation, nakedly.

The logic and also the intellectual straightforwardness are entitled to respect. It is easier to evade the issue than to answer it. Still it must be said that Calvin's answer fails, not so much because it is untrue in its terms as because it is inadequate in its conception alike as regards God Who saves, and man who is saved.

His Conception of God

God is supreme, and to Him and His will all salvation must be referred. But we must not therefore think of Him as mere Supreme Will. God is seen in Christ, and all that we see of God's character there—His love, His compassion, His striving, His patience—is as true and real a part of the conception of God as Will is. Calvin is not insensible of this, but he does not do it justice. The real fault of Calvinism is not that it relates everything to God and God's Sovereign Will, but that it has not a sufficiently rich, sufficiently human, sufficiently Christian idea of the God Whose will is sovereign. In this what we may call the evangelical Arminianism of John Wesley was a true protest, and is a quite different thing from the Pelagian Arminianism of an earlier day which made man joint author of his salvation. But, also as regards man, Calvin—as Augustine before him—is less than adequate. Man does not save himself; he is saved by God. Still, that which is saved by God is *man*—not a thing, but a rational, moral being, with the reality and responsibility of freedom unalienable from him. We cannot in logical terms bring together this Divine Sovereignty and this human freedom; they must, like parallel lines, meet in infinity, and are for us at present a perpetual antinomy. But we must

not so assert one as to deny the other. These considerations are not denials of Calvinism—which, indeed, cannot be denied—but they are cautions which must be kept in mind on every assertion of it.

The practical, as distinguished from the merely theological, import of Calvinism is noteworthy. It might be thought that such a system would paralyse men. On the contrary, men and nations influenced by this type of thinking have proved among both the strongest and freest in history. It called men to be strong because it related life to God; and called them to be free because those thus bound to God must not bind conscience and life to man. It was this cult that brought the reformed churches through the martyr age of Protestantism, and that produced men like Coligny and Gustavus Adolphus and Knox, and (in later days) the Puritans. Not the intricacies of a theology, but the governing thought—that God is supreme and that we are God's—was the saving principle by which Calvinism, with all its defects, not only saved Protestantism, but "saved Europe." See Arminianism; Augustine: Election; Predestination; Theology.

P. Carnegie Simpson

Calvinistic Methodist Church of Wales. Religious denomination which had its origin, but independently, in the same revival as Methodism in England, but whose organization is Presbyterian. It originated in South Wales in the preaching of Griffith Jones (1684-1761) and Howell Harris, a layman (1714-73). Harris with the cooperation of several Welsh clergymen, of whom the most notable was Daniel Rowland, arranged the first Methodist Association of 1743. Thomas Charles (1755-1814), also a clergyman, became leader and organizer of Calvinistic Methodism, laying emphasis on the Sunday school. In the beginning no schism from the established church was contemplated, but as numbers grew they were forced to register the meeting-houses as dissenting chapels to secure the protection of the Toleration Act.

The movement being regarded with disfavour by the Anglican episcopate, the supply of episcopally ordained ministers fell off. Charles ordained 21 ministers in 1811, thereby formally declaring the Welsh Methodists a separate body. In 1823 a Confession of Faith was drawn up, largely the Westminster Confession with a Calvinistic interpretation.

By the constitutional deed each church is governed by a minister and a number of elected elders, a district meeting, a presbytery assembling usually monthly, a quarterly association meeting in N. and S. Wales, and a general assembly of all churches.

In 1955 there were 1,559 places of worship with 450 ordained ministers and 157,124 members. These figures did not include a mission church in Assam, India, with 181,067 adherents.

Calvo, BONIFACE (fl. 1250-70). Genoese troubadour who wrote in the Provençal language. Many of his pieces are preserved in F. J. M. Raynouard's *Choix de Poésies des Troubadours*, 1816-21.

Calvo, CARLOS (1824-1906). South American jurist and politician. Born at Buenos Aires, Feb. 26, 1824, he became a lawyer and entered the public service. His first diplomatic missions were on behalf of Paraguay, but later he represented Argentina in Berlin 1885-99, and Paris, 1899-1905. He died in Paris in May, 1906. Calvo made a great reputation by his treatise on international law, 1863. He was also the author of a compendious work on the revolution in Latin America, published 1864-75, and produced a collection, in 15 volumes, of treaties and diplomatic documents of the countries therein, 1862-69. He was one of the founders in 1873 of the Institute of International Law.

Calyciflorae. In botany, the third series of the Polypetalae, a subdivision of the dicotyledons in Bentham and Hooker's system of classification. They are distinguished by having united sepals and stamens inserted on a disk which terminates the flower stalk.

Calydon. City of Ancient Aetolia, in Greek mythology the scene of the hunt of the monstrous boar, sent by Artemis to plague the country. The boar was killed by Meleager, the first blow, according to one account, being struck by Atalanta. In the time of Caesar, Calydon was a fortified city, but sank into insignificance after the inhabitants had been transferred by Augustus to the newly founded city of Nicopolis in Epirus.

Calypso. In Greek mythology, a nymph, daughter of Atlas, who lived in the island of Ogygia. Here Odysseus was cast ashore, after having suffered shipwreck as a punishment for having killed and eaten of the sacred oxen of the sun-god Helios in the island of Thrinakia. Odysseus remained for

seven years in dalliance with the nymph until Zeus ordered her to allow Odysseus to return home. (*See* Odysseus.)

In the West Indies a calypso is a ballad sung as a solo, or in chorus, to celebrate some topical event. Usually improvised, or prepared at very short notice, it may consist of lines rhyming irregularly or simply of broken prose.

Calyx (Gr., husk or shell). In botany a collective name for the outer whorl of floral organs. It consists of the sepals, which may be separate or more or less united. As a rule the calyx is green, and serves as a protection for the more delicate petals, stamens, and pistil of the unexpanded flower-bud. When the petals are absent, the calyx is sometimes brightly coloured, as in marsh marigold and sea-milkwort. If the sepals are separate one from another, the calyx is polysepalous; if united to form a tube, it is gamosepalous. In some flowers, e.g. poppies, the sepals fall when the flower bud opens and are described as caducous.

In some monocotyledonous flowers, e.g. bluebell, there is no difference between the first two whorls of floral parts. Here, instead of distinguishing sepals and petals, they are referred to as perianth members or tepals.

Cam. Projecting part of a disk or wheel grooved or recessed or otherwise shaped so as to convert rotary motion into a reciprocating motion. The term is probably a variant of comb, and has come to be applied to the entire disk or wheel when so shaped. Cams may be used to convert straight-line motion into a rotating one: an example is the heart-shaped cam used on pedometers to restore the "hand" or index to zero; here a straight push-bar presses against the edge of the cam, and when pressed will cause the cam to turn to its neutral position, carrying with it the arbor on which the pointer is mounted. Rotating cams are used on printing and textile machinery. In motor-car engines, cams mounted on a camshaft driven by the engine are used to operate the inlet and exhaust valves. In automatic lathes, intricately shaped cams govern the carrying out of a whole sequence of consecutive operations upon work mounted in the lathe.

Cam. River in Cambridgeshire, England, formerly the Granta. Rising on the S.W. border of the county, it flows N.W. and N.E. for 40 m. to the Ouse $3\frac{1}{4}$ m. S. of Ely. It is navigable to Cambridge.

Camacho, MANUEL ÁVILA (1897-1955). President of Mexico. Born and educated at Teziutlan, Puebla, April 24, 1897, he joined in the revolution against Huerta, 1914. In 1927 and again in 1929 he succeeded in persuading peacefully other rebels to lay down their arms. Minister of war under President Rodríguez, 1932-1934, he was president, 1940-46. He followed a policy of moderate reform at home, and brought his country into the Second Great War on the side of the Allies in 1942. He died Oct. 13, 1955.



Manuel Camacho, President of Mexico

Camaguey OR PUERTO PRINCIPLE. East central province of Cuba. The second largest prov. of the island but the least densely peopled, it has a mainly undulating surface and is well wooded. It yields sugar and tobacco; cattle are reared and copper, iron, and chromium are mined. Area 10,064 sq. m. Pop. (1953) 618,376.

Camaguey OR PUERTO PRINCIPLE. City of Cuba. Capital of the prov. of the same name, it is 47 m. W. by S. of Nuevitás, its port, and is a rly. junction. Most of its trade is in cattle and sugar. Founded c. 1515, it has a cathedral dating from 1617 and some 18th-century churches. It was raided by (Sir) Henry Morgan in 1668. Pop. (1953) 204,254.

Camafieu. French term for a painting in monochrome or single colour. It has been explained as the use of two tints, i.e. while the relief might be in white or grey, its background might be in another colour.

Camaiore (anc. Campus Major). Town of Italy, in the prov. of Lucca, 12 m. N.W. of Lucca. Connected by narrow gauge rly. with Viareggio, it is noted for its beach. Pop. (1951) 24,295.

Camaldulensians. A Roman Catholic religious order of hermits and monks. It was founded by S. Romuald, a Benedictine monk, of Camaldoli, on the Tuscan Hills, about 1012, for the purpose of combining the hermit life of the East with the monasticism of the West. A white habit is worn, and the life is a strict interpretation of the rule of S. Benedict, including personal solitude, total abstinence from meat and other severe fasting, except in sickness, and manual labour. It is a small order, but

still possesses congregations in Italy, Poland, and Brazil. An order of nuns founded in 1076 still exists in Italy and France.

Camaná. Town of S. Peru, capital of Camaná prov. It lies 80 m. W.S.W. of Arequipa, near the mouth of the Majes r., and is on the Pan-American Highway. It has an airport. In a district producing cotton, sugar cane, olives, grapes and other fruits, lucerne, and grain, it engages in cotton ginning, fruit canning, and cottonseed oil extraction. Pop. (est.) town, 2,500; prov., 11,000.

Camargo, MARIE ANNE DE CUPIS DE (1710-1770). French dancer. Born in Brussels April 15, 1710, she was trained from childhood for the stage. Under her grandmother's family name of Camargo she made her Paris début in 1726 and at once became the rage, also in time the mistress of several wealthy noblemen. She appeared in some 70 ballets, and was the first to introduce a shortened ballet skirt to what afterwards became the regulation length. She died April 20, 1770. A ballet society named after her was founded in London, 1930. See Ballet; Rambert.

Camargue. District of southern France, often called the Ile de la Camargue. It is a marshy plain between the two chief mouths of the Rhône and forms its delta. Its area is about 300 sq. m., and it is not unlike the fenlands of England, although the soil is less fertile. Dikes protect it from the sea and the rivers, and on it are a number of lagoons, several being of considerable size; the largest is the Etang de Vaccares. Fish are found here and salt is obtained. Wild birds are abundant, sheep and cattle feed on the rough pasture, and vines are grown. In the summer malaria and mosquitoes are rife. Camargue is noted for its long-haired breed of dogs. A district on the W. of the Petit Rhône is known as the Petite Camargue.

Camarilla (Span.). Word meaning a little room, and used by analogy for a clique or small body of men who meet more or less in secret. It came largely into use in 1814, when Ferdinand II in Spain surrounded himself by a camarilla of unscrupulous courtiers.

Camarina. Town of Sicily. It is situated on the coast, 45 m. S.W. of Syracuse, from which it was colonised 599 B.C. Destroyed by the Syracusans 553, by the Carthaginians 405, and by the Romans

258, it was razed to the ground by the Saracens A.D. 853. Very few ruins of the old city remain.

Cambacérès, JEAN JACQUES RÉGIS DE (1753-1824). French statesman. Born at Montpellier, Oct. 15, 1753, a member of the family of the legal nobility, he sat in the Convention of 1792, was appointed to the Committee of Public Safety 1794, and to the Five Hundred 1795. In 1799 he became second consul, and on the fall of the consulate was made duke of Parma, arch-chancellor of the Empire, and permanent president of the Senate. Cambacérès was employed during the Terror on legislative work, and later in drawing up the Code Napoléon. After the rising of the Hundred Days he was exiled, but pardoned in 1818. He died March 8, 1824.

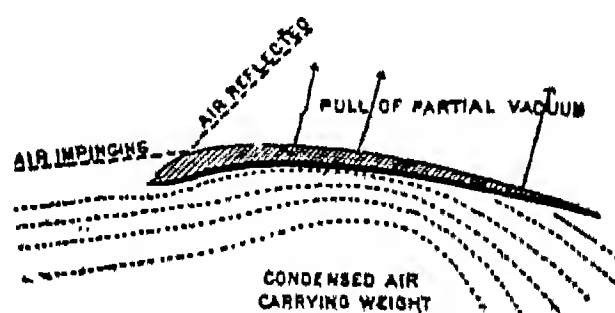
Cambay. Former small state of India, merged in Bombay prov. (later state) 1948. Mainly an alluvial plain, it had an area of 392 sq. m.

Cambay. Town of Bombay state, India. On the Mahi river, it stands at the head of the Gulf of Cambay, 52 m. S. of Ahmadabad, and is connected by rly. with Baroda. Formerly an important port, and capital of the state of Cambay, it declined with the silting up of its harbour. It trades in cotton, grain, and tobacco, and is noted for its agate, cornelian, and onyx ornaments. There are many ruined Jain temples, partly buried in sand; and the town also has ruined walls and towers. Pop. (1951) 39,038.

Cambay, GULF OF. Deep inlet in N.W. India, between Kathiawar and the mainland of Bombay. About 80 m. long by 25 m. broad, it receives several rivers, including the Narbada and the Tapti.

Camber (Fr. *cambrer*, to arch). Term given to the degree of vertical curvature of certain surfaces, such as arched bridges, roadways with their highest part at the centre, ships' decks similarly shaped, birds' wings, aeroplane wings, airscrews, and sometimes control surfaces.

In engineering, a camber is an upward curve given to a girder to allow for load. In architecture,

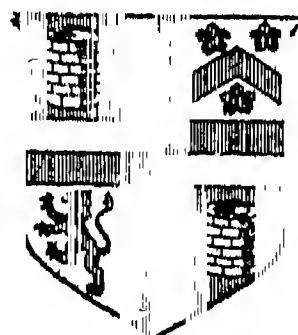


Camber. Diagram showing section of aeroplane wing cambered to deflect the air

the term is used by analogy for a slight upward curve to correct the illusion of sagging afforded by a straight line. In aeronautics, a camber is the vertical dimension of an aerofoil section, i.e. the cross section of a wing along its chord line. (See Chord.) All aerofoil sections have a convex upper surface. If a single figure is given for camber, it usually applies to the maximum height of the upper surface along the chord; this lies within the forward portion and usually coincides with the maximum thickness of the wing. The camber of any point on the upper or lower surface is the measurement of the height of that point above or below the chord, perpendicularly to the chord. Specification of the camber at a series of known points is the method used to define the shape of an aerofoil.

Camberley. Residential district in Surrey, England. It is 7 m. S. by W. of Ascot. Here is the army's staff college, built in 1858; near by, at Sandhurst, the Royal Military Academy; at Frimley Park, the W.R.A.C. staff college.

Camberwell. Metropolitan borough and parish of S. London, England. Situated S. of the



Camberwell borough arms

Thames, it has an area of 7 sq. m. and is chiefly a residential suburb. It includes the districts of Peckham, Nunhead, and Dulwich, and in Peckham Rye and Dulwich Park

possesses two large open spaces. Camberwell Green was noted for its fairs. In 1948 the four M.P.s were reduced to two. Dulwich College, Alleyn's school, Wilson's grammar school, the Mary Datchelor girls' school and Dulwich picture gallery are in the borough.

Browning and Joseph Chamberlain were natives; on Denmark Hill Ruskin lived 1864-71, Bessemer died, and Mendelssohn composed Spring Song. Pop. (1951) 179,729.

During the Second Great War over 3,600 houses were demolished by air raids or so damaged that they had to be pulled down.

Cambist (Ital. *cambista*, money changer). One who exchanges foreign coins or deals in foreign notes and bills of exchange. The word also refers to the books in which different weights, measures, and coins are converted into those of a particular country. See Exchange; Bill of Exchange.

Cambodia. Kingdom of Asia. It forms the S.W. corner of Indo-China and is bounded by Siam and Laos on the N., Vietnam (Central and South) on the E. and S.E., and has a coastline some 200 m. long on the Gulf of Siam. The boundary with Vietnam begins at the coast, crosses the valley of the Mekong, and follows a generally easterly direction until it turns N. to Laos; much of this frontier is hilly, as is the E.-W. part of that with Siam.

In the rainy season a large part of the W. is occupied by the Great Lake (Tonle-sap or Bien-ho), which then overflows to flood the surrounding marshes. When the Mekong is in flood the surplus waters of that river also enlarge the lake until the flood subsides. The lake contains many fish, and in its neighbourhood there are splendid ruined cities that are a reminder of the greatness of the former empire of Cambodia; and prehistoric remains of an earlier Khmer civilization. The former empire spread Brahmanism in the E., and the Angkor Vat ruins (see pictures, page 421) contain many statues of Hindu deities, although images of Buddha have since displaced some of the earlier monuments.

Cambodia is divided into 14 provinces and is ruled by a king. A constitution introducing parliamentary government was promulgated in 1947, and a national assembly was elected in 1955.

Most of the people are indigenous Khmers, whose religion is a compound of Buddhism and Brahmanism, with animistic traits. There are some 220,000 Laotians and Vietnamese, 250,000 Chinese, and 3,000 Europeans in the country



Cambodia. 1. Prea-sat-ling-poun temple in Nakhon Thom. 2. Royal elephant at Pnom Penh. 3. Penon woman at her house-door. 4. Native ox on a rice plantation

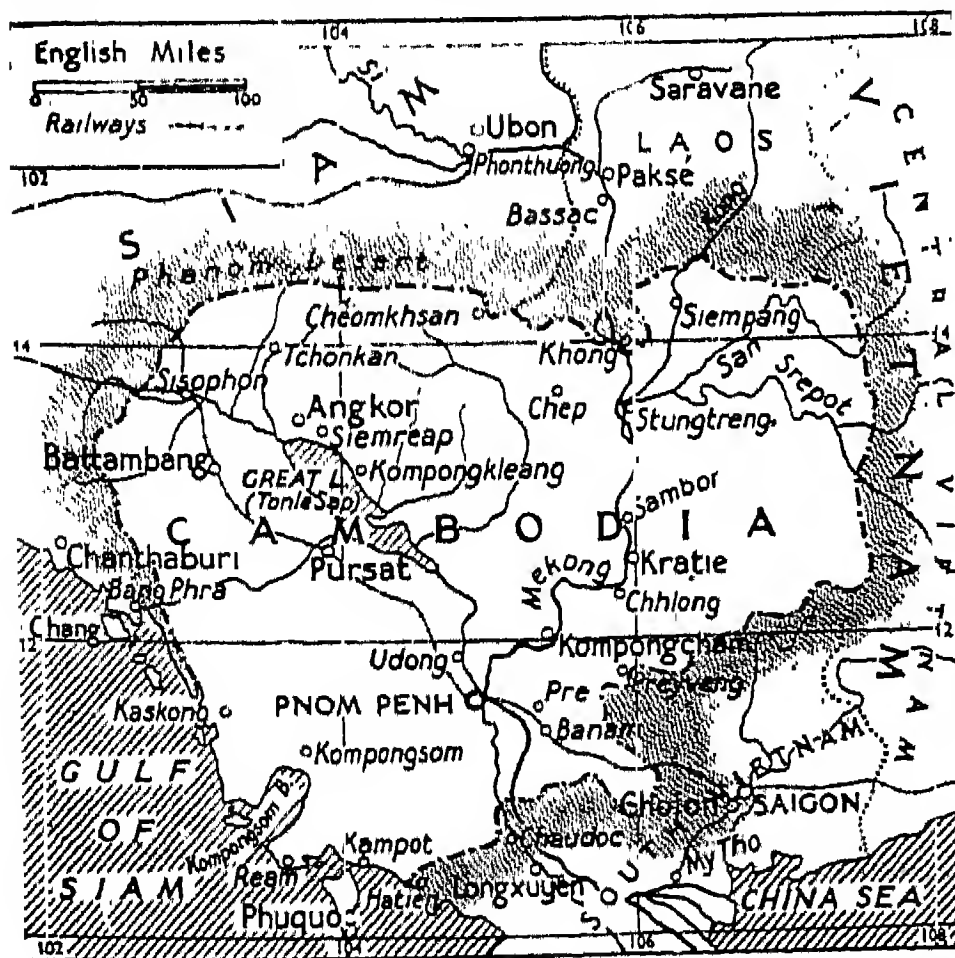
as well as several primitive tribes in the N.E. About three-quarters of Cambodia is covered by forests. The chief products are rice, pepper, and rubber; sugar, kapok, tobacco, cotton, maize, silk, and beans are also produced. Cattle rearing and fishing are important occupations. Area 70,000 sq. m. Pop. (est.) 4,500,000.

Pnom Penh, a river port on the Mekong, is the capital. It is connected by road, river, rly., and air with Saigon, in Vietnam. Kampot is the only large sea harbour; Kep and Réam are smaller ports.

In the past, the king of Cambodia was a vassal of the emperor of Siam; but when France made Cochinchina (South Vietnam) a colony in 1863, he transferred his allegiance to France, and remained under French protec-

tion until the Second Great War when Siam seized Northern Cambodia early in 1941 and the Japanese later in the same year established control of the whole country. The king remained loyal to France, which in 1946 recognized the autonomy of Cambodia; in 1950 it achieved independence within the French Union. The complete independence of Cambodia was agreed to by France in 1954.

Cambon, JULES MARTIN (1845-1935). French diplomatist. Born in Paris, April 5, 1845, the son of a magistrate, he became a member of the Paris bar. In 1870, when the Franco-Prussian War broke out, he enlisted. From 1874 he held administrative posts in Algeria, becoming prefect of Constantine in 1878. Recalled to France, after some years as secretary-general of the prefecture of police, he was prefect of the Nord 1882, and the Rhône 1887, and in 1891 was made gov.-gen. of Algeria. In 1897 he went as ambassador to Washington, whence he was transferred to Madrid in 1902. At the Algeiras conference Cambon took a leading part in the prolonged negotiations with Germany regarding Morocco. When the First Great War broke out he was ambassador



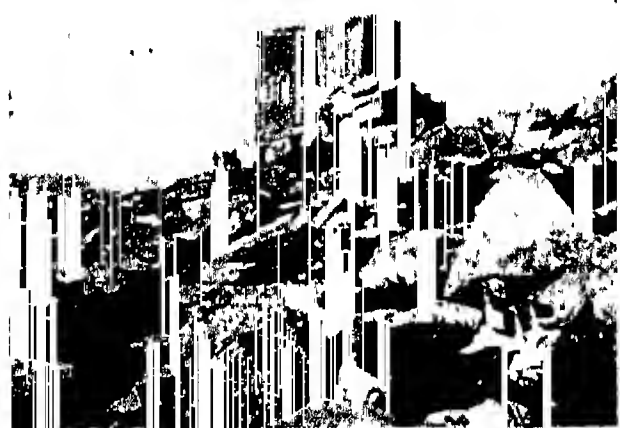
Cambodia. Map of the independent kingdom in Indo-China, formerly a protectorate of France

at Berlin, where he had been since 1907, and he was one of the French signatories of the treaty of Versailles, 1919. He died at Vevey Sept. 19, 1935.

Cambon, PIERRE PAUL (1843-1924). French diplomatist, ambassador to London 1898-1920. Brother of Jules Cambon (*v.s.*), he was born Jan. 20, 1843, and studied law in Paris. From 1870 he was principal assistant to Jules Ferry, and in 1882 was appointed a minister plenipotentiary of the second class, becoming French resident at Tunis. In 1886 he was appointed ambassador at Madrid, in 1890 at Constantinople, in 1898 at London. There his tact and skill were immediately needed to abate the tension caused by the Fashoda Incident (*q.v.*), and were subsequently used to promote the successful conclusion of the Entente Cordiale. He died in Paris May 29, 1924.



Paul Cambon,
French diplomatist



Camborne-Redruth. Carn Brea Rock
crowned by castle ruins

Camborne-Redruth. Urban dist. of Cornwall, England. On a hill 9 m. W.S.W. of Truro, it forms part of the co. constituency of Falmouth and Camborne. Industries include tinmining, engineering, quarrying, and the making of chemicals, textiles and clothing, and sausages. Pop. (1951) 35,829.

At Camborne is a famous school of mines; at Redruth the Cornwall technical school. S. Martin's, Camborne, restored 1862, has an unbroken record of its rectors since 1308. On Carn Brea, a rock near by 741 ft. high, are remains traditionally associated with the Druids, and ruins called Carn Brea Castle. At Redruth in 1792 Wm. Murdoch first demonstrated gas lighting.

Cambrai. City of France, in the dept. of Nord. An important river port on the Escaut 37 m. S. by E. of Lille, served also by rly. and air, it has been famous from the Middle Ages for its fine muslins

(cf. *cambric*). Much of its textile industry is mechanised, but home weaving still survives. Bleaching, dyeing, distilling, light engineering are other industries. Pop. (1954) 29,657. Cambrai was wrecked in the French Revolution and in both Great Wars, and few old buildings remain.

In the 5th century the city was the capital of a Frankish king and the seat of a bishop. Fortified during the Middle Ages, its position laid it open to constant assaults, while strife between the powerful bishop and the wealthy citizens made for further turbulence. It became part of France when Louis XI seized it on the death of Charles the Bold, duke of Burgundy, but was handed over to the duke's heir, the emperor Charles V. In 1678 it became definitely French. The famous league of Cambrai (1508) was a combination of several formidable states directed against the power of Venice.

On account of Cambrai's frontier position there have been various meetings and treaties in the city, one of the most notable being that concluded between Francis I and Charles V in 1529. In 1559 the bishop was raised to the rank of an archbishop; previously he had been made a duke, and the extent of his possessions, which were known as Cambresis, or Cambrai and the district round it, gave him great power.

Early in the First Great War Cambrai was entered by the Germans, who retained it until October 5, 1918. On the eve of their enforced retreat the Germans started fires in various quarters, causing much destruction. In 1919 the city was awarded the Legion of Honour. There was heavy fighting in the Cambrai area during the campaign of 1940, when Allied forces en-

deavoured to hold the line of the Escaut. On May 24 German forces broke this line, capturing the town two days later. Cambrai was liberated Sept. 2, 1944, during the lightning advance of the British 2nd army into Belgium.

Cambrai, BATTLES OF. Two major engagements fought during the First Great War. The first took place in Nov., 1917. Late in that year the Germans were heavily pressing the Italians, and it was with the idea of relieving that pressure, by containing the German forces on the Western front, that an offensive was launched by the British 3rd army under General Byng. In place of the customary bombardment before the attack a large number of tanks were employed to destroy barbed wire entanglements and machine-gun posts. The attack was launched on Nov. 20, and achieved great initial success; but the tanks were unable to hold the ground gained owing to the lack of supporting infantry. The Germans made heavy and persistent counter-attacks upon Bourlon Wood (*q.v.*) to the west of Cambrai, and the attack on Cambrai was perforce abandoned. But the battle marks a turning point in military history, in that the power of massed tanks in attack was unmistakably demonstrated for the first time.

The final British offensive against the Germans was started in Aug., 1918; and the British 1st army, to which a Canadian corps had been attached, was allotted the task of capturing Cambrai. The Canadians attacked on Aug. 26 and gained their first objectives; but the Germans had strengthened their rearward lines where resistance was very heavy. The German line protecting Cambrai on the N.W. was attacked on Sept. 2



Cambrai. Place d'Armes, centre of this old French city; on the right is the Hôtel de Ville, and, in the distance, the church of St Gery

and captured the same day. The Germans withdrew hurriedly in this area, but made a stand behind the Canal du Nord, 7 m. in front of Cambrai. On Sept. 27 the canal was crossed and German positions to the N. of Cambrai captured. The advance was continued the following day, and Fontaine-Notre-Dame to the W. of the town was stormed.

By now Cambrai was in danger of envelopment; but violent German counter-attacks recovered lost ground in several places. On Sept. 30 a further British and Canadian advance to the N. carried the line beyond Cambrai to the canal at Ramillies. By Oct. 1 the suburbs of the town had fallen; and the British 3rd army, which had attacked on Sept. 27, was making steady progress on the 1st army's right flank, having reached the neighbourhood of Marcoing, 4 m. S.W. of Cambrai, the same day. The 1st and 3rd armies established contact at Fontaine-Notre-Dame; and the advance was continued against bitter opposition. After heavy fighting the Germans were driven over the Escaut Canal; and British troops established themselves firmly in Marcoing.

On Sept. 29 units of the 3rd army crossed the canal near Masnières, 4 m. S. of Cambrai, and at other points, thus increasing the pressure on Cambrai from the S. German resistance was now stronger than ever; but the British ring was slowly tightened, the town being captured on Oct. 5. This battle was one of the most fiercely contested engagements of the war, and the success of the operations was due mainly to the magnificent achievements of the Canadian troops.

Cambrai, LEAGUE OF. Founded in 1508 with the object of crushing the power of the republic of Venice. Its instigator was Pope Julius II, and its members were Louis XII of France, Maximilian, the future emperor, Ferdinand of Aragon, and a number of Italian princes—the rulers of Mantua and Ferrara among them. The treaty of alliance was signed Dec. 10, 1508, and war began in 1509. After some marked and rapid successes, dissensions broke out, the league crumbled to pieces, and Venice was saved.

Cambria. Medieval Latin name of Wales, the land of the Cymry, a Celtic people. Strictly, it is distinguished from Cumbria, the Cymric territory farther N., between the Solway Firth and the Ribble, including Cumberland.

Cambrian Range. Name given to the mountain system of Wales. The main portion extends N. to S., through the counties of Carnarvon, Denbigh, Merioneth, Montgomery, Radnor, Cardigan, Brecknock, and Carmarthen. The section in the N.W. is the most important, the highest summit, Snowdon, 3,560 ft., being the culminating point of England and Wales. To the S.E. rise the Berwyn Mts. (2,713 ft.), which are joined by the Cader Idris group, containing Aran Mawddwy (2,970 ft.). Farther S. the system broadens out between Cardigan Bay and the English border, and here Plynlimon attains 2,468 ft., and gives rise to the Severn, Wye, and other rivers. From Plynlimon the Mynydd Bach (1,183 ft.) strikes off to the S.W., being continued to the coast by the Mynydd Prescelly (1,760 ft.), and to the S.E. lies Radnor Forest (2,166 ft.). The S. extremity of the Cambrian Mts. embraces the Brecknock Beacons (2,907 ft.) and the Black Mts. or Forest Fawr (2,630 ft.).

Cambrian System. Oldest system of sedimentary rocks that yield organic remains. It is so called from its development in Wales, or Cambria. It is characterised by abundance of forms belonging to the extinct sub-class Trilobita, and is well developed in Britain, in N. and S. Wales, Shropshire, Warwickshire, the Malvern Hills, and the N.W. Highlands of Scotland. It always rests with unconformity on igneous and metamorphic rocks, or on older sedimentary rocks devoid of organisms.

The system is normally divided into three groups: Lower, Middle, and Upper Cambrian, which are characterised by the trilobite genera *Olenellus*, *Paradoxides*, and *Olenus* respectively.

The rocks consist mainly of quartzitic sandstones, shales, and slates, with a general absence of limestones, except in the Baltic basin and Scotland. In N. Wales they occur in two main areas, the larger centred on Harlech (the Harlech Dome) and around Carnarvon. The gritty Lower Harlech Beds are not seen to rest on the Pre-Cambrian, but near Llanberis they grade downwards into a basal conglomerate which does. The Mid- and Upper Cambrian consist mainly of slates and shales. They are extensively quarried for slate from Bethesda to Nantlle, and near Tremadoc. The Cambrian of S. Wales occurs in Pembrokeshire, and is similar in

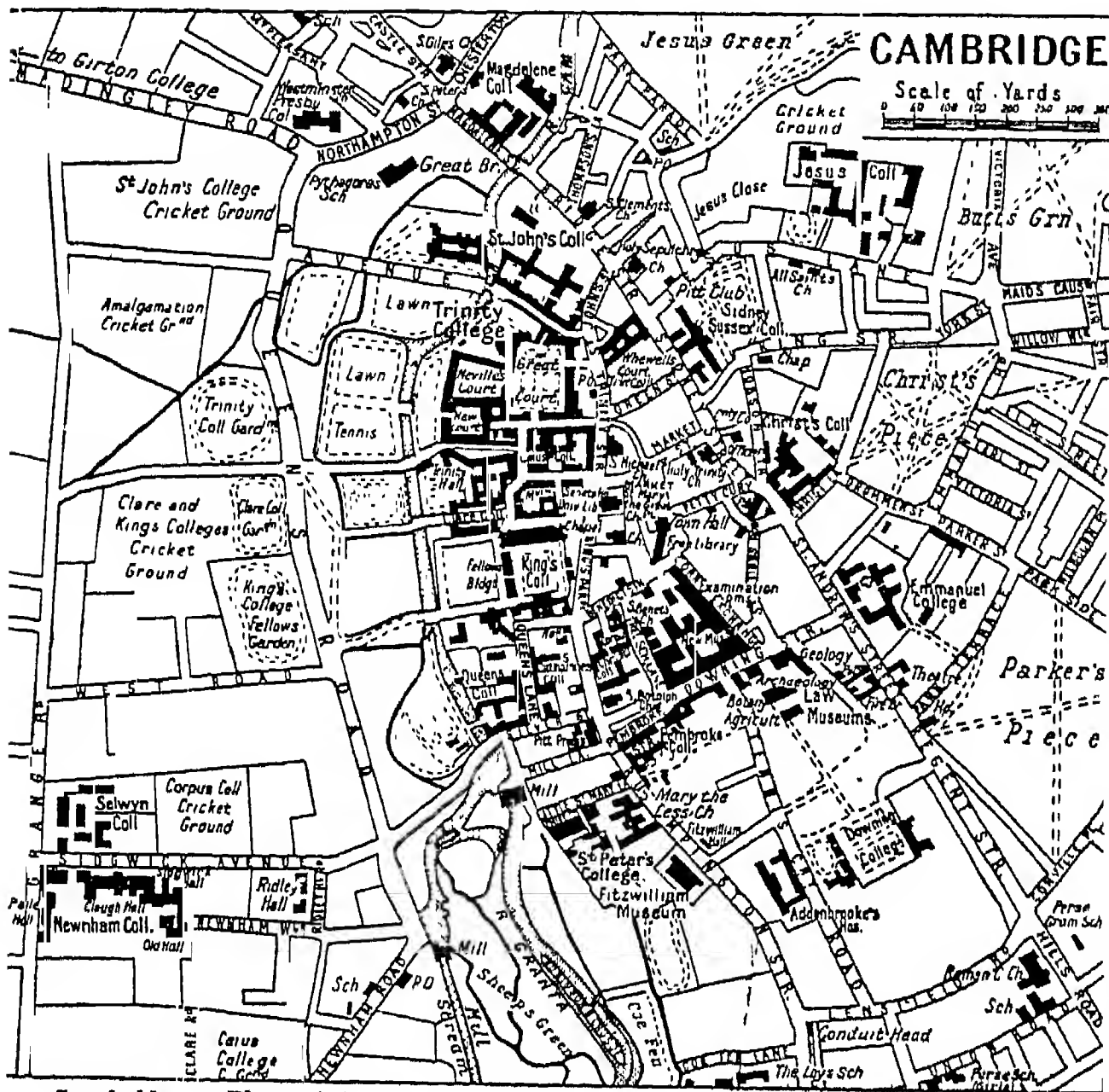
character to that of N. Wales. In the Midlands the lowest member of the Cambrian is a basal quartzite often quarried for road metal. It grades upwards into sandstone which, in Shropshire, is overlain by four thin limestone beds. The Mid-Cambrian consists of sandstones and shales, and the Upper is predominantly shale. The lower beds of the Skiddaw Slates of the Lake Dist. are Upper Cambrian and parts of the Manx Slates of the Isle of Man are probably the same age. In the N.W. Highlands of Scotland Cambrian strata form a narrow strip from Loch Eriboll to S.E. Skye. Pebbly quartzite lies at the base, and passes upwards into beds with worm borings (pipe rock). Next come shales and grits succeeded by some 1,500 ft. of limestone and dolomite with chert (Durness Limestone). The upper part of this last group is considered Ordovician in age. The fauna found in this area have affinities with American rather than English or European species.

On the continent of Europe, the rocks of this system are well developed, though relatively of no great thickness, in Scandinavia, Russia, Bohemia, and Spain. In N. America the deposits show considerable variation in thickness, thinning from E. to W. They present marked similarity to the rocks of Europe, and the observed distribution of the types of strata has led to the suggestion that a continental tract occupied much of the N. Atlantic Ocean in Cambrian times. See Geology; Rock

Cambrian Ware. Very light, thin, salt-glazed stoneware, tea services, jugs, etc. Painted in vivid enamel colours with landscapes, figures, flowers, and animals; rough in design but effective. The ware was produced between 1760–1850 at works opened at Swansea in 1760 by Haynes, by whom they were sold to Dillwyn in 1802. See Pottery; Swansea Porcelain.

Cambric. Fine fabrics made from smooth yarns, free from hairiness and with the plain weave distinct. The material is linen or combed cotton yarn. Cambric is used for handkerchiefs, underclothing, and embroidery. The name is derived from Kameryk, Flemish for Cambrai, the first home of manufacture.

Cambridge. City, borough, and county town of Cambridgeshire, England. It stands on the Cam, 56 m. N.N.E. of London, from where it is reached by two railway lines. Its main



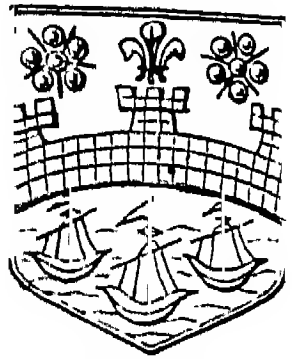
Cambridge. Plan of the city, which is the county town of Cambridgeshire

interest centres in the university, but apart from this it is a market centre for agricultural produce, and there are radio and

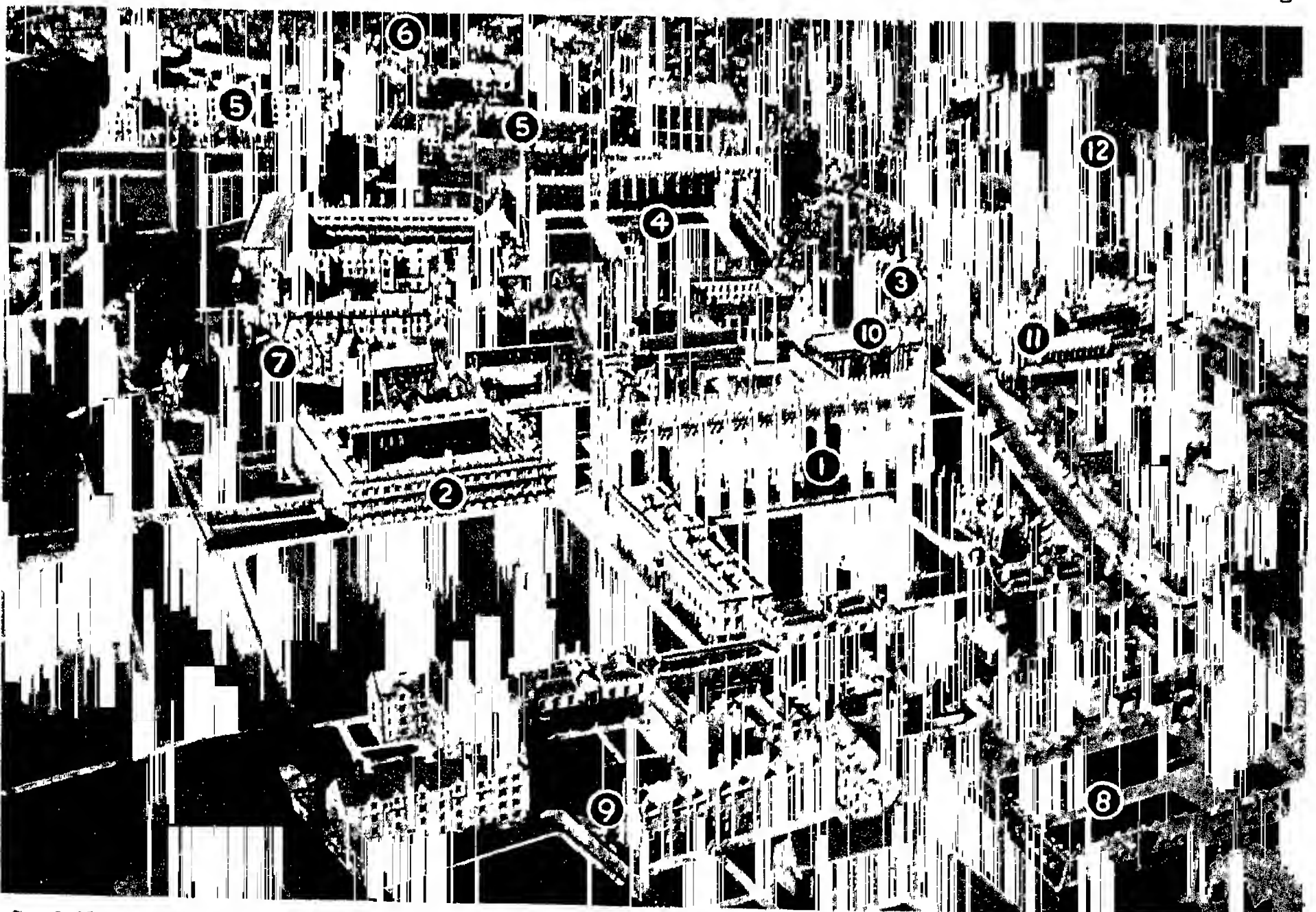
scientific instrument factories. The principal buildings are those of the colleges, libraries, museums, laboratories, etc., belonging to the

university. Of its churches S. Mary the Great is the university church; S. Benet's, with fine pre-Norman tower, and the church of the Holy Sepulchre, one of the four round churches in England, are noteworthy. Its educational establishments, outside the university, include theological colleges (Anglican, Presbyterian, Wesleyan, Congregational), a teachers' training college, the Leys School, and the Perse Grammar School.

There was probably a British, and certainly a Roman, settlement here. In Norman times Cambridge had a castle, and in the 12th century was a chartered town. River shipping was important and so were its fairs from an early date. Cambridge received the dignity and title of a city in 1951. It is governed by a council of aldermen and councillors, and forms a bor. constituency. Stourbridge Fair was held at Barnwell down to 1934. Pop. (1951) 81,463. See also Cambridge University; and under the names of the various colleges.



Cambridge arms



Cambridge. Air view showing part of the town and some of the colleges. On the left is seen the river Cam, crossed by several bridges; the thoroughfare on the right of the photograph is King's Parade. 1. King's College. 2. Clare. 3. Gonville and Caius. 4. Trinity. 5. Two parts of S. John's. 6. Magdalene. 7. Trinity Hall. 8. S. Catherine's. 9. Queens'. 10. Senate House. 11. Church of S. Mary. 12. Sidney Sussex

Cambridge. City of Massachusetts, U.S.A., on the N.W. bank of the Charles river. It is the seat of Harvard university, the oldest and most renowned institution of higher education in the U.S.A., with approximately 10,000 resident students; Radcliffe College, for women, allied with Harvard, with a student body of 1,000; and Massachusetts Institute of Technology, the country's leading technological educational institution, with 2,000 men and women students. Despite its predominantly academic atmosphere, Cambridge is a leading industrial centre, ranking second in the state in the value of its manufactured goods, and third in New England to Boston and Providence, R.I.

It has 500 manufacturing and distributing plants, producing soap, glass, rubber, ink, wire cable, valves, and boxes. There are printing works and confectionery plants. The first galvanised iron pipe, the first machine-made piano keys, and the first mechanical egg beater are said to have been made here.

Cambridge shares with its neighbour, Boston, an illustrious historical and literary background. It was settled in 1630 by the Massachusetts Bay Co. under Governor Winthrop, and was the scene of outstanding events of the American revolution. On the Watertown road George Washington assumed command of the American army on July 3, 1775, and for some time Cambridge was the headquarters of the first army. It was the birthplace of O. W. Holmes and J. R. Lowell, and the home of Longfellow, the last two having been professors at Harvard. Harvard was founded in 1636, Radcliffe in 1879, and M.I.T. in 1916. Cambridge was incorporated in 1636 and became a city in 1846. Pop. (1950) 120,740. There is a Cambridge in Ohio, pop. 14,739.

Cambridge, Duke of. English title, dating from 1706. There was an earl of Cambridge in the reign of Edward III, and the title was borne by the dukes of York until

the death of Richard III in 1485. Between 1619-51 it was borne by the marquesses and dukes of Hamilton, and later by Henry, a son of Charles I. In 1706, to give him a position in England, George, electoral prince of Hanover, afterwards King George II, was made duke of Cambridge, and in 1801 the title was revived for Adolphus Frederick, the seventh son of George III. When his son, the 2nd



Cambridge, Mass. Elm tree beneath which George Washington assumed command of the American army, July 3, 1775

duke, died in 1904 it became extinct.

Cambridge, ADOLPHUS FREDERICK, 1st Duke of (1774-1850). Seventh son of George III of England. Born Feb. 24, 1774, he joined the Hanoverian army in 1793. In 1813 he became a field-marshal in the British army. In 1801 he was created duke of Cambridge, and in 1802 a privy councillor. He was viceroy of Hanover 1815-37. He married in 1818 Augusta, a daughter of Frederick, landgrave of Hesse-Cassel; they had a son, who succeeded to the title, and two daughters. Of the latter one married the duke of Mecklenburg-Strelitz, and the other Francis, duke of Teck, by whom she was the mother of Queen Mary.

Cambridge, GEORGE WILLIAM FREDERICK, 2nd Duke of (1819-1904). British soldier. Grandson of George III, and first cousin of Queen Victoria, he was born at Hanover, March 26, 1819, and came to England in 1830. He joined the British army in 1838, and after holding various home commands, commanded a division in the Crimea; he was at the Alma and Inkerman, where his horse was shot under him, and was invalided

home in Dec., 1854. He succeeded Lord Hardinge as commander-in-chief in 1856. In 1890 the commission on military administration reported against the office of

commander-in-chief, but not until 1895 did the duke of Cambridge reluctantly resign. He died March 17, 1904, and was buried beside his wife at Kensal Green. In defiance of the Royal Marriages Act, he married Louisa Fairbrother; his three sons adopted the name of FitzGeorge.

Cambridge, ADOLPHUS, 1st Marquess of (1868-1927). British prince. Born Aug. 13, 1868, at Kensington Palace, he was the eldest son of Francis, duke of Teck, and brother of Mary, George V's queen. Educated at Wellington and Sandhurst, he entered the army in 1888 and served in the S. African War, and in the First Great War. He was assistant military secretary at the War Office in 1915, and military secretary at G.H.Q. in 1916. He succeeded his father as duke of Teck in 1900, which title he relinquished in 1917, when the names of the royal family were changed, and was created a British peer as marquess of Cambridge. He married a daughter of the 1st duke of Westminster, 1894, and died Oct. 24, 1927. He was succeeded by his son, George Francis Hugh (b. 1895), as 2nd marquess.

Cambridge Heath. A former open space of N.E. London. Its name is preserved in that of a station on the Enfield and Chingford line from Liverpool St., between Bethnal Green and London Fields.

Cambridge Square. London square, N. of Hyde Park. It forms with Oxford Square part of the district of Tyburnia, laid out in the time of William IV.

Cambridgeshire. Inland county in the E. of England. Situated to the N. of Herts and Essex, and including the Isle of Ely, which forms a separate administrative county, it is 48 m. long, has a breadth varying between 16 m. and 30 m., and covers an area of 864 sq. m. To the S. and S.E. the surface is elevated. The whole of the Isle of Ely forms part of the Bedford Level (*q.v.*), but most of the fen is drained. The Ouse, traversing the county from W. to



George William Frederick, 2nd Duke of Cambridge
Downey

E., the Cam (formerly Granta), Nene, Lark are the chief rivers.

Agriculture flourishes throughout the county, and the valley of the Cam is noted for its dairy farms and excellent breed of sheep. Various manufactures are engaged in, but jam-making alone is of special importance; other articles produced are malt, beer, baskets, and bricks; while lime and chalk are among the minerals quarried. Waterway communication is provided by the Old and New Bedford rivers, running almost parallel in a S.W. and N.E. direction. The co. contains one bor. and one co. constituency; the Isle of Ely is separately represented. The chief towns are

Cambridge (county town), Ely, Wisbech, Chesterton, and March. Pop. (1951) 166,863.

Occupied in ancient times by the Iceni, Cambridge (*Camboritum*) became a station of the Romans. Named Grantbridgeshire by the Saxons, Cambridgeshire was later overrun and devastated by the Danes. Ely is celebrated for the gallant resistance made by Hereward the Wake to the Norman invaders. Cambridgeshire is rich in archaeological remains; at Thorney and Denny there are abbey ruins, and many ancient dykes are found in the S.E.

LITERARY ASSOCIATIONS. Chaucer's *Canterbury Tales* may be remembered near the Trumpington

mill, for there dwelt the miller of whom *The Reeve's Tale* tells. Milton's description of King's College Chapel, and his epitaph on Hobson the carrier, may be recalled. Bunyan is believed to have described the Cambridge Stourbridge Fair as Vanity Fair in *The Pilgrim's Progress*. Wordsworth, who wrote a sonnet on King's College Chapel, has many Cambridge passages in *The Prelude*, and a section of Tennyson's *In Memoriam* includes reference to Cambridge. Rupert Brooke's poem on Grantchester abounds in allusions to the county.

Cambridgeshire, THE. Horse race run at Newmarket. The course is one mile and a furlong, and the day the Wednesday of the Houghton meeting in October.

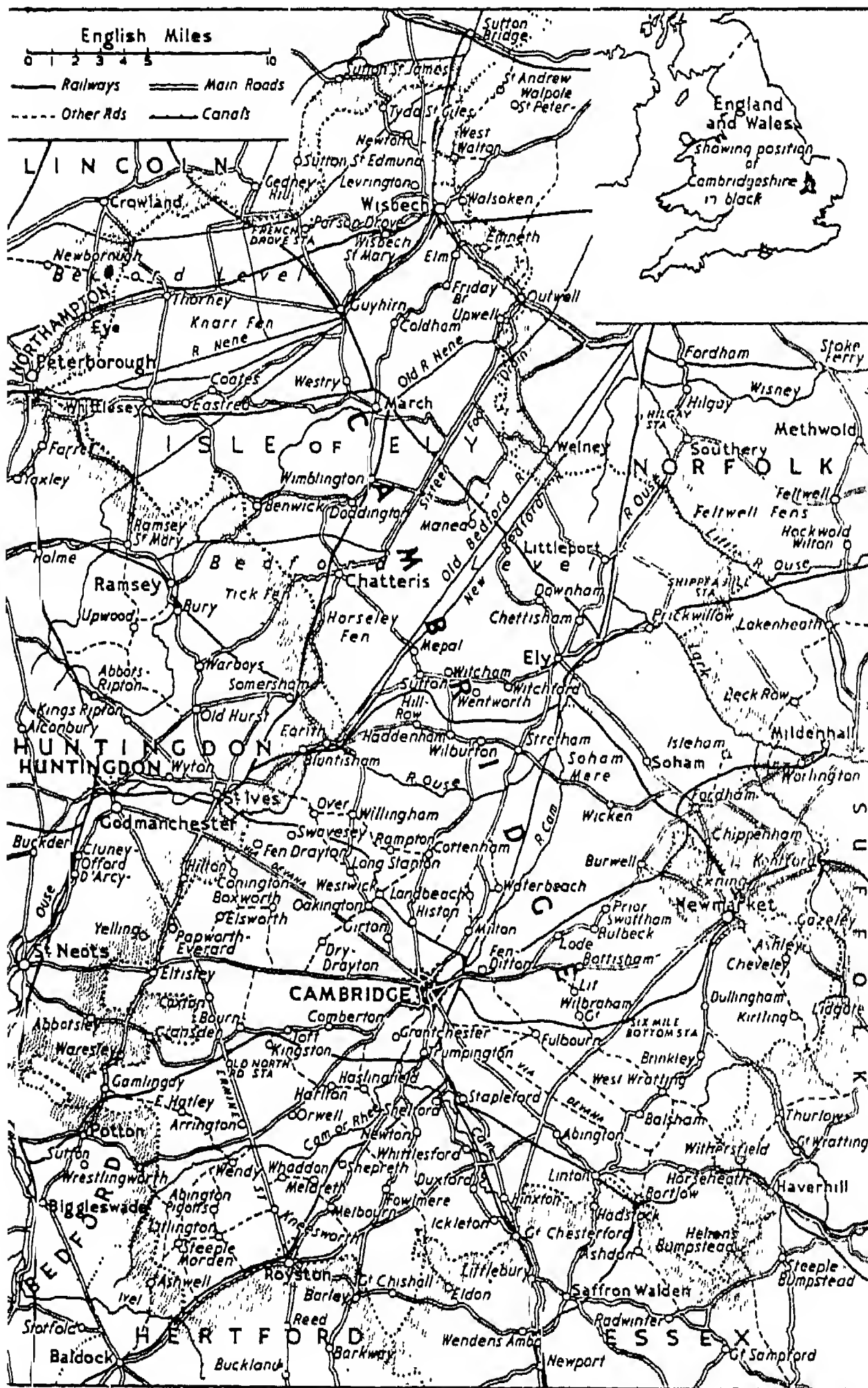
Cambridgeshire Regiment. Regiment of the British Army formed in 1860 as the Cambridge battalion of the Suffolk regiment (q.v.). This battalion served in the South African War. When the Territorial army was formed in 1907 a Cambridgeshire regiment was raised as a unit consisting of Territorial battalions only. The first battalion, embodied Aug., 1914, went to France early in 1915 as part of the 5th army. In the Second Great War the regt., again a bn. of the Suffolk regt., was captured at Singapore in Feb., 1942. In 1947 it became a light A.A. regt. of the R.A.

Cambridge Theatre. Situated in Earlham Street, Cambridge Circus, London, this playhouse was opened Sept. 4, 1930, and has a seating capacity of about 1,200. Its first production was *Charlot's Masquerade*. Other plays that had successful runs at the Cambridge included *Elizabeth of England* and *A Night in Venice*. Its Sunday afternoon concerts were a popular reflection of musical taste in the Second Great War.

Cambridge University. One of the two ancient English universities. The exact date of the foundation of an organized body of scholars at Cambridge is not known. In the 11th and 12th centuries a number of religious foundations such as the Augustinian canons of S. Giles were already established, and early in the 13th century there is evidence of the existence of a body of students in Cambridge. Certainly in 1231 this body was sufficiently important to cause Henry III to issue injunctions relating to stu-



Cambridge University arms



Cambridgeshire. The northern part of this inland eastern county forms part of the reclaimed fen-land known as Bedford Level

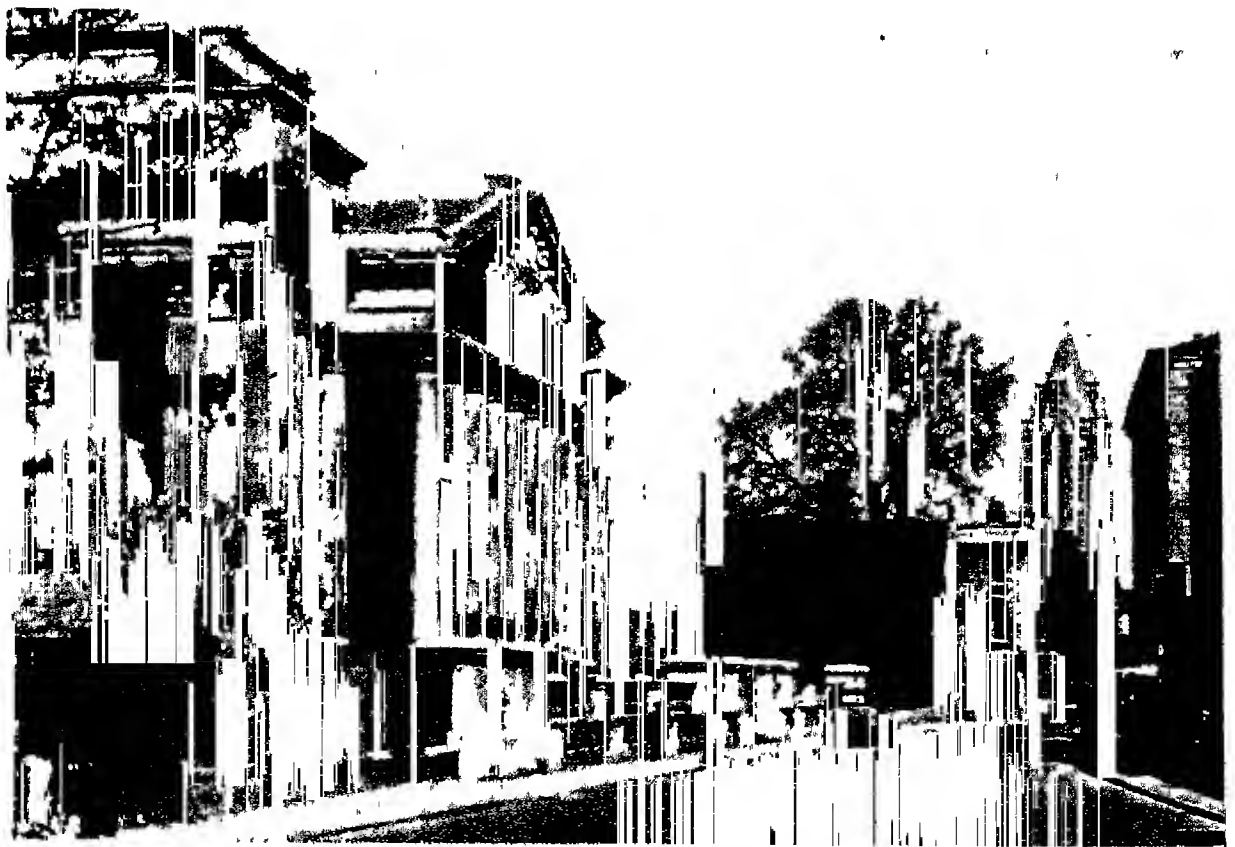
dent life, but the university, as a whole, was loosely held together and "town and gown" riots were frequent. The disciplinary problem was in part solved by the foundation of the first college (Peterhouse) by Hugh de Balsham, bishop of Ely, in c. 1257. The privileges of the university itself were confirmed by Pope John XXII in 1317 and from the 14th century new colleges have been founded from time to time—until the 19th century, exclusively for men.

After Peterhouse, 1257, come Clare, 1326, Pembroke, 1347, Gonville and Caius, 1348, Trinity Hall, 1350, Corpus Christi, 1352, King's, 1441, Queen's, 1448, St. Catharine's, 1473, Jesus, 1496, Christ's, 1505, St. John's, 1511, Magdalene, 1542, Trinity, 1546, Emmanuel, 1584, Sidney Sussex, 1596, Downing, 1800, Selwyn, 1882. (In this work each college is dealt with under its own heading.) Girton College, 1869, and Newnham College 1871, two colleges for women, were technically not part of the university until 1948; women students attended lectures and sat for examinations, and from 1921 were allowed to use the titles of the degrees they had won, but only in 1948 did Girton and Newnham become fully recognized colleges of the university. A third college for women, New Hall, was opened in 1954.

Officers of the University

The principal officers of the university (which is legally a corporate body consisting of the chancellor, masters, and scholars) are the chancellor, normally a non-resident member of high distinction; the vice-chancellor, the active head of the university, who is elected annually from among the heads of colleges; the proctors, responsible for university discipline; and the registrary, who keeps records of proceedings. Before 1950 the university returned two members to parliament.

Each college is an independent corporation, consisting of the master (except at King's where he is provost and at Queens' where he is president), fellows, and scholars. The university and the colleges are closely interdependent: each college makes an annual contribution to university funds; no one can be matriculated (*i.e.* admitted to the university) unless he has first been accepted by a college or by the non-collegiate body; and no one can come into residence in a college unless he has



Cambridge University. Corinthian portico of the Fitzwilliam Museum, in which is housed one of the most valuable art collections in England. Beyond the Museum can be seen Peterhouse, the oldest of the colleges, founded c. 1257

passed the Previous (or "Little-go") entrance examination.

Normally an undergraduate proceeds to the degree of bachelor of arts (either by taking a tripos, or honours examination, in a particular subject or by taking a less exacting "pass" examination) at the end of three years; four years later he may proceed to the degree of master of arts without further examination. Of these masters of arts a certain number remain in the university as teachers or administrators, and become members of the Regent House, and it is to this body that legislative power in the university belongs. Non-resident M.A.s become members of the senate, which now has very little power. The council of the senate is the body through which all legislative proposals must pass; the financial board is responsible for the management of the property, income, and expenditure of the university, and the general board of the faculties for educational policy. In addition to these three main bodies of university government, each faculty has its own board and there are various syndicates which control the local examinations (school examinations held throughout the Commonwealth), the University library, Cambridge University Press (*q.v.*), the Fitzwilliam Museum, and the botanic garden. The library, which possesses books bequeathed to the university in 1415, is the oldest public library in the world. It contains more than a million books and has the right to claim a copy of every book published in England; since 1934 these books have been housed in the new library built from the designs of Sir Giles Gilbert Scott.

From time to time Royal commissions have been appointed to investigate the conditions and needs of the two ancient universities. The last of these was set up in 1919 and was followed by a statutory commission whose statutes were approved by the king in council in 1926. Under these statutes Cambridge received an annual grant from the Treasury (at first £120,000, rising to £1,500,000 by the mid-fifties); the power of legislation was given to the Regent House; and provision was made for pensions for all university and college officers.

Old and New Professorships

In the university there are 93 professorships; some of these, like the Regius professorships of divinity, civil law, physics, Hebrew, and Greek, established by Henry VIII, are ancient foundations, but more than half of them (*e.g.* the chairs of English literature, biochemistry, and political science) belong to the present century. One of the most famous is the Cavendish professorship of experimental physics; it was in the Cavendish laboratory that J. J. Thomson, Rutherford, and others were the pioneers of the investigation of the atom.

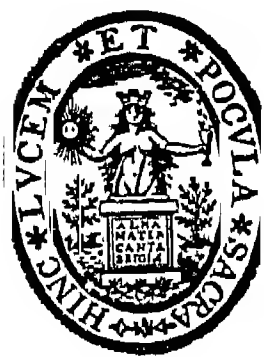
Whereas in 1862 there were 1,526 undergraduates in residence, in 1914 there were 3,676; in 1954 there were 6,143. Athletic and social clubs are provided in great numbers for the undergraduate both in the colleges and in the university: the Union Society offers him weekly political debates, and there are clubs for every kind of activity. On the river the colleges compete in "bumping" races, and the annual boat-race

against Oxford, the cricket match at Lord's, and the Rugby match at Twickenham have become national institutions. *See* Blue.

S. C. Roberts

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Cambridge University Press. English printing and publishing house. The first Cambridge printer



Cambridge University Press emblem

was John Siberch, a friend of Erasmus, 1521-23. In 1534 Henry VIII granted to the university a printing charter and the office of university printer has been filled without interruption since that date. The present printing house at Cambridge dates from 1804 and the Pitt Press building (part of a memorial to William Pitt) from 1831. A London house was opened in 1873 and in 1938 moved to Bentley House, Euston Road. The press shares with the Queen's printers and the Oxford University Press the privilege of printing the Authorised Version of the Bible, and the Book of Common Prayer, and its more notable publications include the Cambridge Ancient, Medieval, and Modern Histories, and the works of such eminent men as J. J. Thomson, Rutherford, Eddington, Jeans, Whitehead, Russell, G. E. Moore. *Consult* History of the C.U.P., 1521-1921, S. C. Roberts, 1922.

Cambuskenneth. Ruined abbey in Stirlingshire, Scotland. On the Forth, 1 m. E. of Stirling, it was founded 1147 by David I, and was the meeting place of several parliaments, including that of 1326, the first attended by representatives of the towns. Here were buried James III and Margaret of Denmark; in 1865 their bones were re-interred under a tomb built at the instance of Queen Victoria.

Cambuslang. Parish and town of Lanarkshire, Scotland. On the Clyde, it is 5 m. S.E. of Glasgow, and has a rly. station. It has one of the largest steel-works in Scotland. Pop. (1951) 26,861.

Cambyes. King of Persia 529-522 B.C., son of Cyrus the Great. Soon after his accession he invaded and conquered Egypt, defeating the last Saite pharaoh,

Psammetichus III, at Pelusium, in 525. He was crowned with Egyptian rites at Sais and initiated into the temple mysteries: contemporary Egyptian records indicate his careful orthodoxy in religious matters, in contrast to the savage iconoclasm with which he is charged by Herodotus. His military expedition across the Sand Sea to the Great Oasis met with disaster, and the army he sent against Ethiopia failed to reach Napata although S. Egypt was strongly garrisoned by the Persians. In 522 a pretender claiming to be his brother Bardiya (the Smerdis of Herodotus), whom he had had murdered early in his reign, raised revolt in Persia; Cambyes died on the way back to deal with the rebels. *Pron.* cam-by-sees.

Camden. Town of N.S.W., Australia. One of the earliest settlements in Australia, it is on the Nepean r., 42 m. S. of Sydney. The first cattle from Port Jackson "went bush," and in 1795 were found on this site, which John Macarthur, the father of Australia's sheep industry, chose when granted 10,000 acres by Lord Camden in 1820. Here a settlement grew up called "the private township of Camden"; and here the first merino sheep in Australia were pastured. The town was proclaimed a municipality in 1889. The chief industry of the neighbourhood is dairying; fruit, wine, pigs, fodder, tomatoes, honey, eggs, butter, and vegetables are produced, and coal is mined. Secondary industries include milk pasteurisation, freezing works, and sawmills. Pop. (1954) 4,847.

Camden. City of New Jersey, U.S.A., the co. seat of Camden co. It is on the Delaware river, opposite Philadelphia, with which it is connected by steam ferry, and is the terminus of the Atlantic City and other rlys. It has shipbuilding yards, dry docks, iron-foundries, carriage, glass, and chemical works, boot, paper, and leather factories, etc. The principal buildings are the city hall, court house, public library, and several hospitals. Founded in 1679, it was named after the 1st Earl Camden, and became a city in 1828. Walt Whitman lived and died here. Pop. (1950) 124,555.

Camden, BATTLE OF. Fought during the War of American Independence (*q.v.*), Aug. 16, 1780. The Americans, taking the offensive, dispatched an army to S. Carolina, where the British were in force, their headquarters being at Cam-

den on the northern border of the state. Lord Cornwallis collected his scattered troops and joined battle. The British were fewer than their opponents, but they were regular soldiers against untrained militiamen, and they routed the Americans. The British losses were 324; the defeated army lost 1,000 killed and wounded, besides 1,000 prisoners and a quantity of stores. This has been described as the greatest success won by the British during the war.

Camden, MARQUESS. British title borne since 1812 by the family of Pratt. This family was settled in Devon in the time of Elizabeth I, and in 1714 one of its members, Sir John Pratt, was made lord chief justice of England. His son, Sir Charles Pratt, who became lord chancellor, was made Baron Camden in 1765 and Earl Camden in 1786. His son John, the 2nd earl, was made earl of Brecknock and Marquess Camden in 1812. John Charles Henry, 5th marquess (b. 1899), succeeded his father in 1943. The family seat is Bayham Abbey, on the borders of Kent and Sussex. An eldest son uses the title earl of Brecknock.

Camden, CHARLES PRATT, 1ST EARL (1714-94). British lord chancellor. Third son of Sir John Pratt,



1st Earl Camden, British lord chancellor

he was educated at Eton and King's College, Cambridge, and called to the bar in 1738. A Whig in politics, he was made attorney-general in 1757 and chief justice of com-

mon pleas 1762, when he was knighted. His decision at the trial of John Wilkes in 1763 against the legality of general warrants gained him immense popularity. Created a baron in 1765, an earl 1786, he was lord chancellor 1766-70. With a short interval, he was president of the council from 1782 until his death, April 8, 1794.

Camden, WILLIAM (1551-1623). English antiquary and historian. Born in London, May 2, 1551, and educated at Christ's Hospital, S. Paul's School, and Christ Church, Oxford, he was appointed second master at Westminster School in 1575. Camden had already begun the preparation of *Britannia*, a Latin survey of Great Britain which was published in 1586.

Headmaster of Westminster School 1593-97, he brought out a

Greek grammar in 1597, and in Sept. of that year retired to become Clarenceux King-of-Arms. Attacked for the mistakes and unacknowledged indebtedness to other sources in the *Britannia*, Camden replied with vigour; and after writing officially on the



Gunpowder Plot in 1607, he issued in 1615 the first part of his *Annales*, a Latin history of the reign of Queen Elizabeth I, completed by a second part published at Leyden in 1625. He died at Chislehurst, Kent, Nov. 9, 1623, and was buried in Westminster Abbey. The first English translation of *Britannia*, by Philemon Holland, was issued in 1610.

The Camden Society, founded by J. P. Collier in 1838 to publish results of antiquarian historical research, was so named in William Camden's honour. It continued its activities until 1900 when it amalgamated with the Royal Historical Society.

Camden Town. District, chiefly industrial, of N.W. London, part of the met. borough of St. Pancras. Many of the streets are named after famous politicians, e.g. Stanhope, Arlington, Mornington, Pratt (afterwards Lord Camden).

Famous residents have included Charles Dibdin, who lies in the old burying ground in Pratt Street; Cruikshank, who died in Mornington Crescent; and Dickens, who lived as a boy in Bayham Street. A statue erected in memory of John Cobden is at the western end of the High Street, close to which, in Crowndale Road, is the Working Men's College.

Camden Town Group. British art movement, of which the leading spirit was W. R. Sickert (*q.v.*) in the years preceding the First Great War. Essentially a small coterie whose aim was a modified form of expressionism, the group included Lucien Pissarro, J. B. Manson, Spencer Gore, Harold Gilman, Henry Lamb, and Charles Ginner—painters who decided to break away from the New English Art club. Meetings and exhibitions were held regularly; in 1913 the membership was enlarged; and the society was finally merged into the London Group (*q.v.*).

Camel (Heb. *gamal*). Group of even-toed ungulate, ruminating mammals, including the camels of the Old World and the llamas of the New. They differ from the true ruminants in having incisor or biting teeth in the upper jaw and two pairs of canine teeth; the upper lip, like that of the rabbit and hare, is divided. They are long in the neck, have a hump or humps on the back, and are covered with shaggy hair growing in patchy fashion. The stomach is complex, and divided into three compartments. The most remarkable feature of the camel family is that the corpuscles of the blood are not circular as in other mammals, but oval as in birds and reptiles, and are nucleated, a condition found in other mammals in the embryo only. The temperature of the blood fluctuates.

Of the two species, the Arabian and the Bactrian, the former, which has a single hump, is found in N. Africa, Arabia, and other parts of Asia. It is longer in the limb than the Bactrian, and has a much shorter coat of hair. The single hump is erect, its size depending on condition, being large and firm when the animal is well fed, and wasting when the animal is half starved. This camel is known as the dromedary (*Camelus dromedarius*), meaning runner, but the term is usually applied to the riding strains as distinguished from the heavier baggage animals. About 20 breeds or strains are distinguished by Arab camel breeders. A good dromedary will

travel at the rate of 9 m. or 10 m. an hour, but 3 m. is a good pace for a baggage camel when loaded. The spreading foot of the animal adapts it for travelling on loose sand, and it is able to go for three days without drinking, the stomach being provided with pouches in which fluid is retained.

The Bactrian or Asiatic camel (*C. bactrianus*) occupies the desert regions of Central Asia, and ranges from Afghanistan to China. It has two humps, short legs, long hair, and is generally of heavier and clumsier build than the other species. It is better adapted for a rocky and mountainous country than for the sands of the desert. It appears to occur in a really wild state only in the more remote parts of Tibet.

In addition to the value of the camel as a beast of burden, its hair is used for making fabrics (*see Camel Hair*), and its milk is highly valued in the countries it inhabits. Its flesh is eaten by the Arabs, and is said to be palatable.

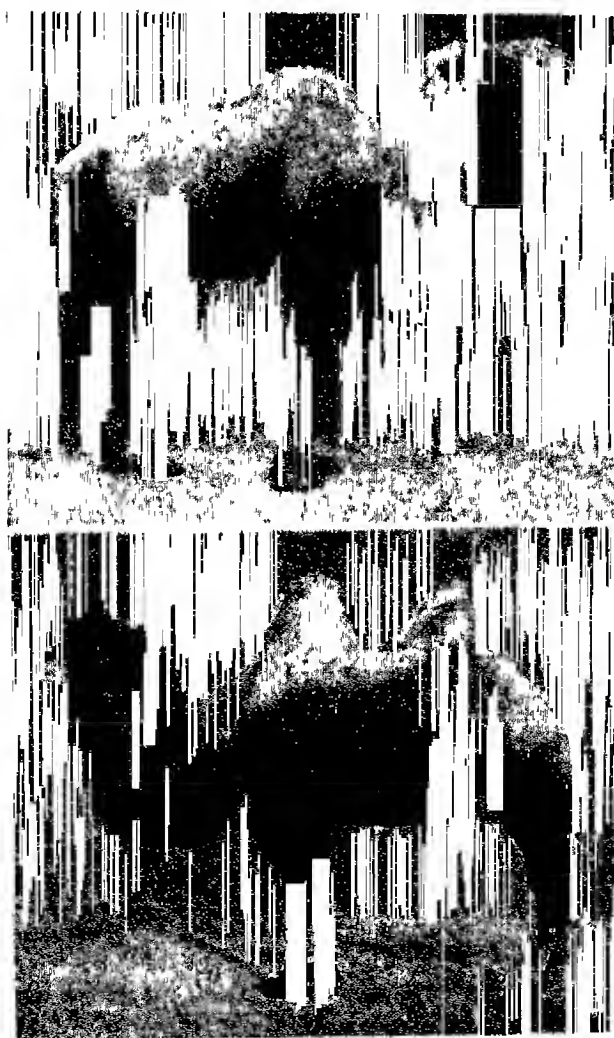
The name camel is also given to a kind of pontoon used for raising sunken vessels.

Camel Corps. Troops mounted on camels. There are a number of camel corps in the British Empire, and they have proved particularly useful for scouting and police work in arid regions unsuited to horses and for small desert patrols which have to live on the country. In the Sudan campaigns of the late 19th century British and Egyptian camel corps did particularly good work. In the First Great War camel corps were used in Egypt against the Turks and the Senussi. Much of the transport services of the Egyptian Expeditionary Force was performed by camel units of the British and Indian Army Service Corps. In March, 1918, was formed the Imperial Camel Corps, which, after the armistice, was dissolved.

The principal camel corps in the British service is the Somaliland corps of the King's African Rifles, which served in the Middle East in the Second Great War. The Somaliland corps has a peacetime establishment of 400 and normally acts as a mounted constabulary.

There is also a camel corps in the Arab Legion (*q.v.*), of Jordan, though it is gradually being mechanised.

Despite mechanisation, troops on camels played an important part in North Africa. In July, 1940, the Somaliland corps made a daring raid across the frontier



Camel. Above, Arabian camel or dromedary; below, Bactrian or Asiatic camel

to destroy the Italian post and ammunition dump at Deberabo. The corps also helped in the liberation of Abyssinia.

In Jan., 1941, the Free French camel corps from the Chad territory made a journey of 200 m. across the desert to raid Murzuk in S.E. Libya, where the Italians had established an air base; they took the garrison completely by surprise and destroyed all the aircraft and buildings. Both Germans and Russians employed camels for patrol and transport work in the battle of Stalingrad (*q.v.*). In winter camel-drawn sledges were used to deliver supplies to fortified posts and field hospitals.

Camelford. Market town and rural dist. of Cornwall, England. It is situated in a picturesque portion of the valley of the Camel, 12 m. N. of Bodmin. The Delabole slate-quarries are in the vicinity. Market day, Fri. Pop. (1951) rural dist., 7,577.

Camel Hair. African, Persian, and Indian camels or dromedaries are short-haired, and their hair is of small commercial importance. The two-humped Bactrian camel of the Central Asian desert produces valuable hair utilisable in much the same way as wool. Supplies for Europe are drawn from Russia and China, the best coming from W. Mongolia.

Two kinds of wool or hair are yielded by the animal, a soft, downy undergrowth, of value for hosiery undergarments, fleecy linings, and winter waistcoats; and a stronger overhair, especially at the haunches, mane, and hump. The two can be segregated by machine-combing, and the strong hair is used for machine belting, filter cloths for oil presses, and other mechanical purposes. The hair is predominantly of a fawn colour, and can be worn undyed. The camel's hair brushes of commerce are made of almost any hair except that of the camel.

Camellia. Genus of evergreen shrubs and trees of the family Theaceae. They are all natives of Asia, and have glossy, leathery leaves and large white or rosy flowers. The best known floral specie is *C. japonica*, a native of Japan and China, and a favourite plant of cultivation, which



Camellia. Native flower of Japan

has produced a great number of varieties and hybrids. It is naturally about 20 ft. in height, with reddish flowers. Introduced into England in 1738, it is grown in pots in loam, sand, and peat in a greenhouse, or out of doors in warm southern counties. *C. sinensis* yields China and Indian teas. The seeds of *C. sasanqua* are crushed to obtain a fragrant oil. The name is derived from Kamel, a Moravian traveller, who first observed the plant.

Camelopard. Name used by the writers of bestiaries for a fabulous animal the size of a camel with the spots of a leopard. It became identified with the giraffe, but may have represented a now defunct form of mammal. As a name for the camel it was retained by encyclopedists until the 19th century.

Camelopardus OR CAMELOPARDALIS. Constellation known to the navigators of the 16th century, but first appearing in a celestial planisphere published by Jacobus Bartschius in 1624. It is a straggling constellation of stars, none brighter than fourth magnitude, and is situated between the Pole Star and Perseus.

Camelot. A legendary city where King Arthur held his court. Various places have laid claim to being the site of Camelot, among them Winchester; Camelford in Cornwall; Cadbury and Queen's Camel in Somerset; and Caerleon-on-Usk in Monmouthshire. At Caerleon the oval earthwork covering the ruined Roman amphitheatre was long called King Arthur's Round Table.

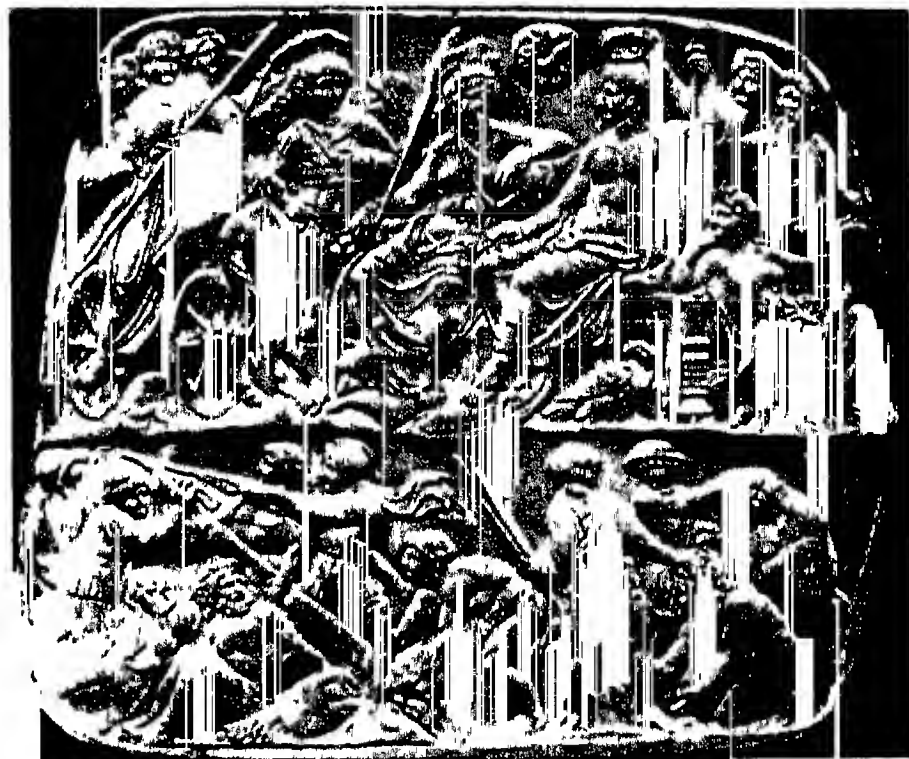
Camel's-thorn (*Alhagi camelorum*). Shrub of the family Leguminosae. A native of the Caucasus, it has herbaceous stems, simple leaves, spiny flower-stalks, and pea-like red flowers in clusters, followed by woody seed-pods. *A. maurorum*, of Asia and Africa, has been thought to have been the source of the manna of the Israelites. In hot weather drops exude from the leaves and harden by exposure to the air, when they are readily shaken off. These are regarded as the manna.

Camembert. Popular soft cheese, first made near the village of Camembert, Normandy, about

1781. A farmer's wife, Mme. Harel, has been credited with its invention, and a statue to her was erected there. The cheese is made of cow's milk, treated with the mould now famous in connexion with the preparation of penicillium. It is at its best when soft enough to be half liquid at the centre, so that when cut it pours very slowly (about 1 in. a day) on the plate. This state can be detected for purchase by light pressure with a knuckle. It is a seasonal cheese, depending for its excellence on the richness of summer milk.

Camenae OR CASMENAE. In Roman mythology, prophetic water nymphs whose sacred spring was near the Porta Capena at Rome. When Greek mythology was introduced among the Romans the Camenae were identified with the Muses, and the name was connected with *carmen*, song.

Cameo (Ital. *cammeo*). Species of carving. Its materials are

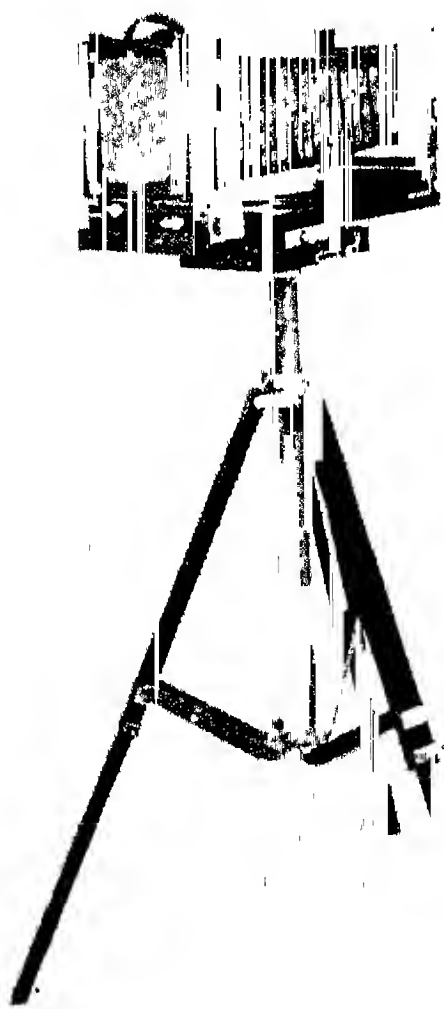


Cameo. Sardonyx cameo of the triumph of Tiberius, known as the Gemma Augustea

semi-precious stones like agate and onyx, and molluscan shells which have at least two layers of different tint. The cutting of gem cameos was an ancient art; that of shells is modern. The lower stratum gives the background, and the upper is carved in low relief.

Camera (Lat., arched roof). Development of the camera obscura (*v.i.*) for the taking of photographs. It consists of a light-tight compartment designed to carry a lens in front which directs rays of light on to film, glass, metal, plastic, card, or paper coated with sensitised emulsion.

Cameras in use may be broadly divided as follows: (1) Stand cameras, used chiefly by professional photographers, on a stand or tripod in the studio and out-of-doors; these range in size of picture roughly from $\frac{1}{2}$ plate



Camera. Standing model for commercial and advertising photography
Photo, Kodak

(6½ in. by 4½ in.) to 12 in. by 10 in. (2) Hand cameras, taking photographs from "vest-pocket" size (2½ in. by 1½ in.) or smaller, up to about 5 in. by 4 in.; most are constructed to take roll film, but some of the larger sizes use plates, cut sheet film, and film packs, and almost all can be used on a tripod if desired. (3) Miniature cameras. (4) Cameras developed for specific purposes.

STAND CAMERAS. To cope with the requirements of commercial and advertising photography, stand cameras usually embody some or all of the following movements: triple extension, i.e. extension of the bellows to give a distance between lens panel and focusing screen equal to just over three times the length of the diagonal of the largest size of plate for which the camera is constructed; interchangeable lens panels; rising front, cross front, or swing front, allowing the lens to be moved in many directions, revolving back, so that the subject may be taken at any angle on

the plate from the upright position to the horizontal.

The plate or cut sheet film used with such cameras is generally carried in double dark slides, and the focusing screen is frequently spring-mounted so that the slide can be inserted between screen and camera back without removing the former. The studio stand for such a camera usually permits the camera to be used at any height from 18 in. to about six or seven ft. above the floor and to be tilted at any angle.

Outdoor stands may incorporate a ratchet-operated rising centre pillar and a top with some sideways tilt and a forward tilt up to 90° so that the camera may be used pointing vertically downward, the three legs being permanently braced to the centre pillar. A simpler tripod more lightly constructed of wood, light metal alloy, or plastic material is used where weight is the first consideration.

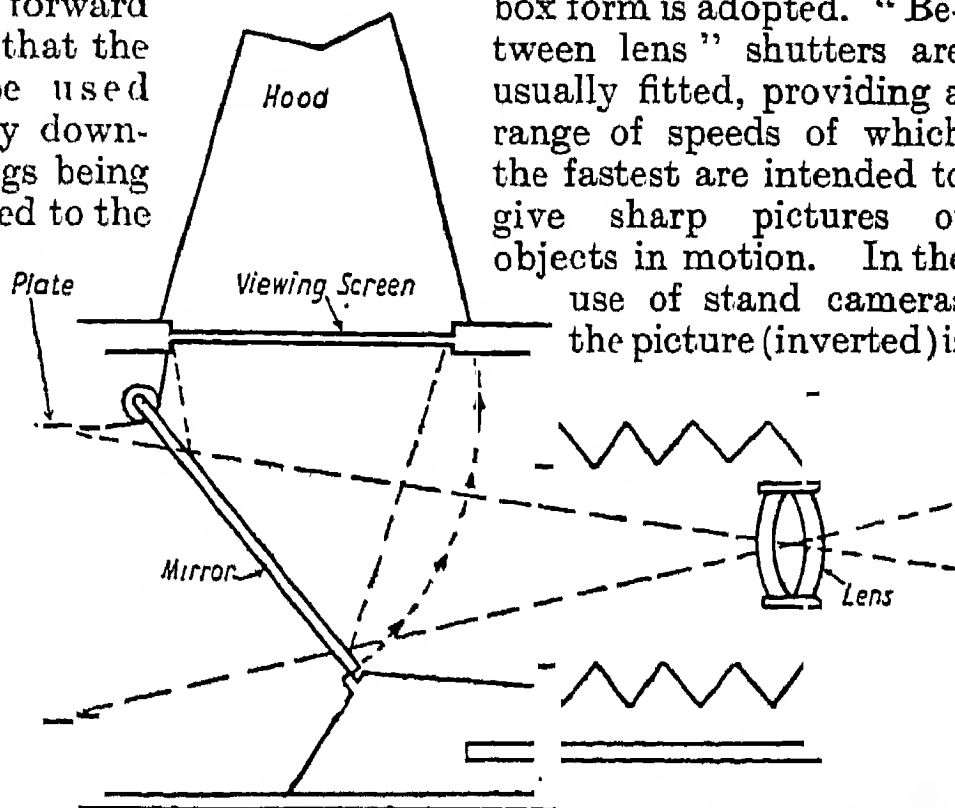
A camera and stand used exclusively for studio portraiture require less versatility of movement. Sometimes negative card (thin card carrying a sensitised coating) is used in place of plates or film. Such cameras are frequently fitted with a "repeating back," a masking device which enables more than one picture to be taken on a single sheet of negative material.

Some special types of camera have been developed for portraiture, e.g. the "Polyfoto" camera which automatically takes 48 separate exposures on one plate measuring 4½ in. by 3½ in.

Stand camera shutters are incorporated in the lens, or are built into the camera behind the lens panel or a separate shutter is used which is attached to the front of the lens. There is usually a

lens hood, preferably extensible, for shielding the lens from extraneous light, and some means of attaching colour filters to the lens.

HAND CAMERAS. These are designed chiefly for simplicity, portability, and lightness, and do not possess the range of movements of the professional apparatus. Most are of the folding type, the lens being supported on a hinged baseboard which forms a protective cover for it when the camera is closed. In others the front carrying the lens is kept fixed "square" with the camera back by two pairs of struts, while in the simplest small cameras a box form is adopted. "Between lens" shutters are usually fitted, providing a range of speeds of which the fastest are intended to give sharp pictures of objects in motion. In the use of stand cameras the picture (inverted) is

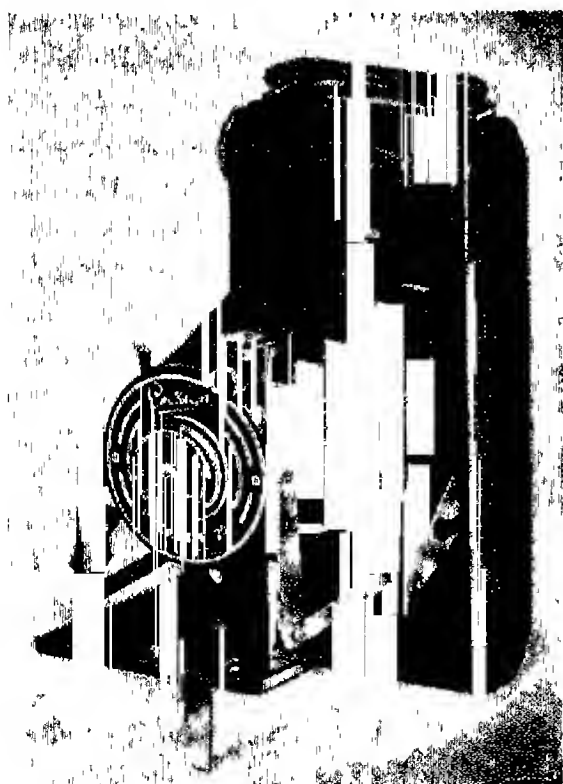


Camera. Diagram of reflex camera: light entering the lens is reflected by the mirror to the viewing screen
From Photography Today, G. A. Spencer (O.U.P.)

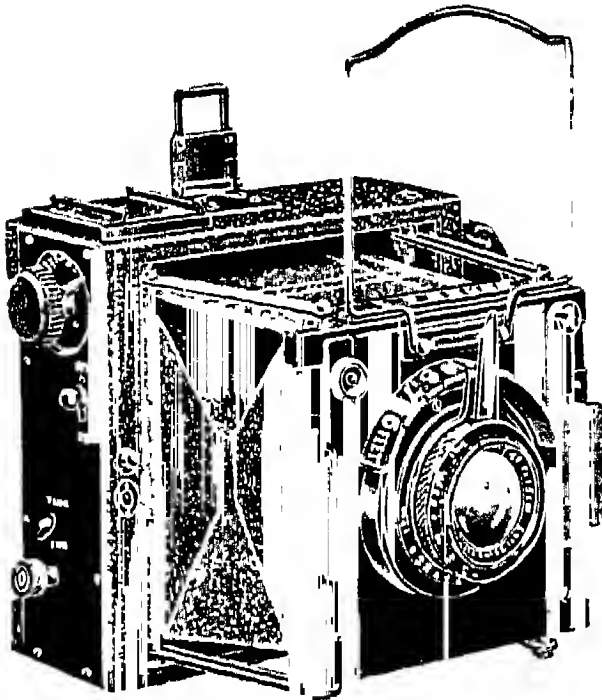
seen and focused on the screen at the rear by placing the head under a cloth to exclude light except through the lens. In the simpler forms of hand camera the distance of the subject is judged by eye, and the lens set at a corresponding point on a scale fixed to the baseboard. The amount of subject included on the plate is separately judged from a "viewfinder," a small reflecting mirror attached to the baseboard or lens front.

Special types of hand camera include the reflex, in which, by a mirror midway within the body, the picture can be seen and focused up to the instant of exposure, on a ground-glass screen in the top of the camera. On pressing a lever, the mirror is raised and the image from the lens allowed to fall on to the plate by the operation of the shutter which is released by the same movement.

The Twin-Lens reflex embodies two similar lenses one above the other of which the upper one is used to focus the picture and is screened from the lower or taking lens, allowing the subject to be



Camera. Hand camera: folding type with hinged base
Photo, Ensign



Camera. Press camera with variable slit and adjustable tension
Photo. Thornton & Pickard

watched during as well as up to the time of exposure.

The so-called Press camera is used at eye-level, the subject being viewed through a direct vision finder; focusing is carried out by "scale." The shutters fitted to reflex and Press cameras are usually of the focal plane type consisting of a roller blind with a slit in it of variable width which travels over and close to the surface of the plate or film.

MINIATURE CAMERAS. This term is properly applied to small cameras taking a picture not larger than $2\frac{1}{2}$ in. sq. The most popular types are those taking a picture 24 by 36 mm. on ciné-film of the standard width of 35 mm., of which film about 6 ft. is loaded into "cassettes" providing 36 exposures without reloading. These cameras have interchangeable lenses of various focal lengths, so coupled with a built-in range and view finder that the setting of the former automatically focuses the lens critically. As the miniature camera has lenses of comparatively short focal length, wide aperture lenses can be used so "fast" as to produce adequate negatives with short exposures under poor lighting conditions. Given correct exposure and appropriate development, the accuracy of these cameras is such that the tiny negatives yield sharp enlargements up to 10 or 12 diams. without showing appreciable grain. The 35-mm. cameras usually have focal plane shutters giving a range of exposures from one to $1/1000$ sec. They have vir-

tually superseded the larger Press cameras for most Press and sporting photography, and are also used extensively for studio portraiture and are attached to microscopes for routine photomicrography.

SPECIAL TYPES. Aerial cameras, used for survey and reconnaissance work, are specially constructed to withstand vibration, and incorporate heating devices to keep film, lens, and mechanism in workable condition at the low temperatures found at high altitudes. Special "louvre" shutters have been designed, and the whole camera is electrically operated and controlled. (See Air Photography.)

Gun cameras are fitted to many military aircraft, and are built integrally as part of a machine gun. They are adjusted and synchronised to record automatically the effect of each burst of fire on the target. Similar cameras, but not mounted on a gun, are used for training gunners to engage moving targets without the expenditure of ammunition.

A fingerprint camera incorporates a ring of very small electric bulbs around the lens to light the subject. These are supplied with current from dry batteries contained within the camera body. A small type of camera is designed especially for photographing fingerprints on the top edges of doors and in places inaccessible to the conventional type. Somewhat similar apparatus on a small scale is used for clinical purposes, and is capable of taking miniature photographs within the human body.

Microfilm recording is carried out by means of automatic or semi-automatic cameras which make copies of documents on continuous strips of film, usually 16 mm. or 35 mm. wide and up to 100 ft. long, such films being either projected on to a screen for reading purposes or printed

through an enlarger as for the airgraph (*q.v.*) service.

The photostat camera, used for copying plans and other documents, makes large photographs direct on to a roll of sensitised paper of which the exposed portion is cut off and processed within the camera.

The process camera, used in the production of plates for photo-mechanical processes, is a large camera travelling on a horizontal stand with the easel carrying the

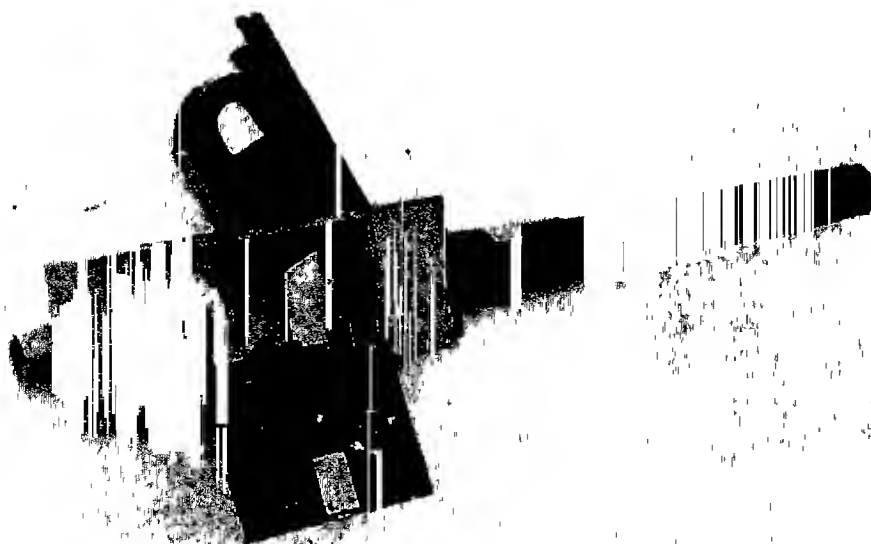


Camera. Fingerprint camera which contains also electric bulbs for illuminating the subject
Photo. Kodak

original at one end. The whole is suspended on powerful springs which damp out vibration.

Cameras designed for recording the visual observations made in such instruments as the microscope are frequently fitted with a prism in the path of the image-forming rays, which deflects a portion of them into a magnifying eyepiece. This enables accurate focusing to be achieved when the illumination is very low. A special type of camera is also used at telephone exchanges to record the readings of subscribers' meters, thus speeding up the work involved in calculation of accounts. See Cinematography; Colour Photography; Enlarger; Exposure Meter; Film Pack; Flashlight; Lens; Photography; Stereoscope; Television, etc.

Camera Obscura (Lat., dark room). Name applied in the Middle Ages to the optical device of a dark box or chamber, fitted with a lens by which the image of an object was cast upon a screen. Its inventor, if any one man deserves the credit of it, was Daniello Barbaro, a Venetian nobleman, who in 1568 was the first to de-



Camera. Camera gun, as used on military aircraft to train gunners without expending ammunition
Photo. Williamson Manufacturing Co.

scribe the use of a convergent (positive) lens in forming an image of a solid object. The camera obscura is little more than a periscope, and apart from its lineal descendant, the photographic camera, the instrument survives only as a side-show at holiday resorts.

Camerarius, JOACHIM (1500-74). German classical scholar. He was born April 12, 1500, at Bamberg, Bavaria. His family name was Liebhard, but he adopted that by which he is known because his family had been chamberlains (Late Lat. *camerarius*) to the bishops of Bamberg. He studied at Leipzig, Erfurt, and Wittenberg where he met Melancthon, whom he assisted, 1530. in drawing up the Confession of Augsburg (*q.v.*). Professor of Greek at Erfurt, 1518, and Nuremberg, 1526, Camerarius later reorganized classical teaching at Tübingen and Leipzig.

Camerino (anc. Camerinum). City of Italy, in the province of Macerata. It stands on a spur of the Apennines, 2,147 ft. high, 69 m. by rly. S.W. of Ancona. The episcopal see dates from the 3rd or 4th century; the citadel, built by Cesare Borgia, dates from 1502. Camerino's small independent university was founded 1727. Pop. (1951) 11,952.

Camerlengo (Late Lat. *camerarius*, chamberlain). Title of three papal officers: (1) the administrator of the temporal property of the papacy; (2) the administrator of the revenues of the college of cardinals; (3) the elected president of the conferences of the parochial clergy of Rome.

Cameron, BASIL (b. 1885). British orchestral conductor. He was born at Reading, Aug. 18,



Basil Cameron,
British conductor

1885, and went to school at Tiverton. In 1913 he was appointed first conductor of the Torquay municipal orchestra; from 1924 to 1930 he conducted at Hastings and Harrogate and at various festivals. He was then mostly in the U.S.A., for six years from 1932, in charge of the Seattle symphony orchestra. Returning to Great Britain, in 1940-41 he built up a reputation as an outstanding interpreter of the classical symphonists. He appeared at promenade concerts in 1941, once

for the Dvorak centenary programme, and in the 1942-44 seasons was associate to Sir Henry Wood at these concerts. During 1945-50 he shared their direction with Sir Adrian Boult.

Cameron, SIR CHARLES ALEXANDER (1830-1921). Irish chemist. Born in Dublin, July 16, 1830, he was educated in Dublin, Guernsey, and in Germany. He was appointed public analyst for Dublin in 1867, and later became chief medical officer for the city. His writings include *A Manual of Hygiene*, 1874, and a *History of the Royal College of Surgeons in Ireland*, 1886. He died Feb. 27, 1921.

Cameron, SIR DAVID YOUNG (1865-1945). A British artist. Born at Glasgow, June 28, 1865, he was educated at Glasgow academy and Edinburgh school of art. Having taught himself to etch, he became one of the outstanding etchers of his day, and examples of his work are in public collections in many countries. His subjects, landscape and architectural, ranged from the Clyde (1890) to Holland, Italy, Paris, and Belgium, his plate of the Five Sisters window in York Minster being considered his masterpiece. He was also a landscape painter of distinction, revealing a strong decorative sense in his pictures of Scottish mountains and lochs. It was as a painter that he became R.A. in 1920. Knighted 1924, he was appointed King's Painter and Limner in Scotland, 1933. He died Sept. 16, 1945.



Sir David Cameron,
British artist

Cameron, SIR EWEN, OR EVAN, OF LOCHIEL (1629-1719). Scottish Highland chief. Eldest son



Sir Ewen Cameron
of Lochiel

of John Cameron of Lochiel, he lived as a hostage with the marquess of Argyll at Inverary 1641-47, when he returned to his clan as its head. Knighted by Charles II in 1681 for his services in the Royalist cause, he was for years in arms, and in 1689 fought at Killiecrankie. He was a notable wolf-hunter, and is said to have killed the last wolf seen in the Highlands with his own hands. He died in

Feb., 1719. The fight between Roderick Dhu and Fitzjames in Scott's *Lady of the Lake* was suggested by Lochiel's exploits.

Cameron, RICHARD (c. 1648-1680). Founder of the section of the Scottish Covenanters known as the Cameronians. Originally a schoolmaster in his native burgh of Falkland, in Fife, he joined the field-preachers, moving great crowds by his eloquence. His protests against the Indulgence granted to the non-conforming ministers were so vehement that armed religious assemblies were declared illegal. In 1678 he retired to Holland, but, soon returning to Scotland, he took a prominent part in the Sanquhar Declaration of 1680, which formally rejected the authority of Charles II. A price was set on his head, and on July 20, 1680, he was slain after a determined resistance at Airds Moss, near Auchinleck. His head and hands were exhibited on the Netherbow Port, Edinburgh. *Consult* Life, J. Herkless, 1896.

Cameron, VERNY LOVETT (1844-94). British explorer. Son of a Church of England clergyman, he was born at Weymouth, July 1, 1844, and entered the navy. In 1873 he was at Zanzibar in charge of the expedition to find Livingstone, who died before he arrived. After exploring the S. side of Lake Tanganyika, he proceeded to W. Africa, and reaching Katombela, Nov. 28, 1875, was the first traveller to cross Africa from E. to W. His other explorations included journeys from Lebanon to Bagdad and Basra, 1878-79, and in the interior of the Gold Coast with Richard Burton in 1882. After retiring from the navy in 1883, Cameron took an active interest in the commercial development of W. Africa. He was killed by a fall in the hunting-field, Mar. 27, 1894. As an author he was successful in adventure tales for boys.

Cameron Highlanders. Scottish regiment, officially known as the Queen's Own Cameron Highlanders. It owes its origin to Alan Cameron, who, about 1790, raised 700 young men in his native county of Inverness, and, as their colonel, led them to the wars. As the 79th Cameron Highlanders they fought against Napoleon in Holland and in Egypt, and helped to defeat the French at Corunna, Talavera, and Busaco.



Cameron Highlanders,
regimental badge

The death of their colonel, Alan Cameron's son, during a street battle with the French at Fuentes d'Onoro, roused them to frenzy and they swept the enemy before them. At Tel-el-Kebir they led the charge on the Egyptian position, and at the battle of the Atbara were selected by Kitchener to storm the Arab zareba. They did good service in the South African War. Nineteen battalions of the Camerons served in the First Great War on the Western Front and in Macedonia, earning the following battle honours: Marne, 1914, 1918; Aisne, 1914; Ypres, 1914, 1915, 1917, 1918; Neuve Chapelle; Loos; Somme, 1916, 1918; Delville Wood; Arras, 1917, 1918; Sambre; and Macedonia.

The regiment had an equally distinguished record in the Second Great War, when a number of extra battalions were raised. At the height of the German offensive in

1940, the Camerons were holding a section of the Maginot Line. After suffering heavy casualties in gallant rearguard actions, they were forced to surrender at St. Valery on June 12. In North Africa, the regiment distinguished itself at the storming of the Wadi Akarit on April 6, 1943. It also served in Italy, and battalions took part in the invasion of the Continent in 1944. The 7th battalion became the 5th Royal (Scottish) parachute battalion in 1942. The depot is at Inverness.

Cameronians. Name given to the Covenanters who followed Richard Cameron (*q.v.*). Their definite severance from the parent body was a result of the religious settlement of 1690. Like the Non-jurors in England they refused to take the oath of allegiance, or to perform any civil duty. In 1743 they formed themselves into a regular Presbyterian Church, the

Reformed Presbytery, and are found chiefly in S.W. Scotland and N. Ireland. Later a branch was established in N. America. In 1876 most of their congregations united with the Free Church of Scotland; the few who did not, still claim to represent the early Cameronians.

Cameronians. Scottish regiment, also called the Scottish Rifles. It was first raised from the amnestied survivors of the Cameronian Covenanters to help William of Orange against James II. At Dunkeld, on Aug. 4, 1689,



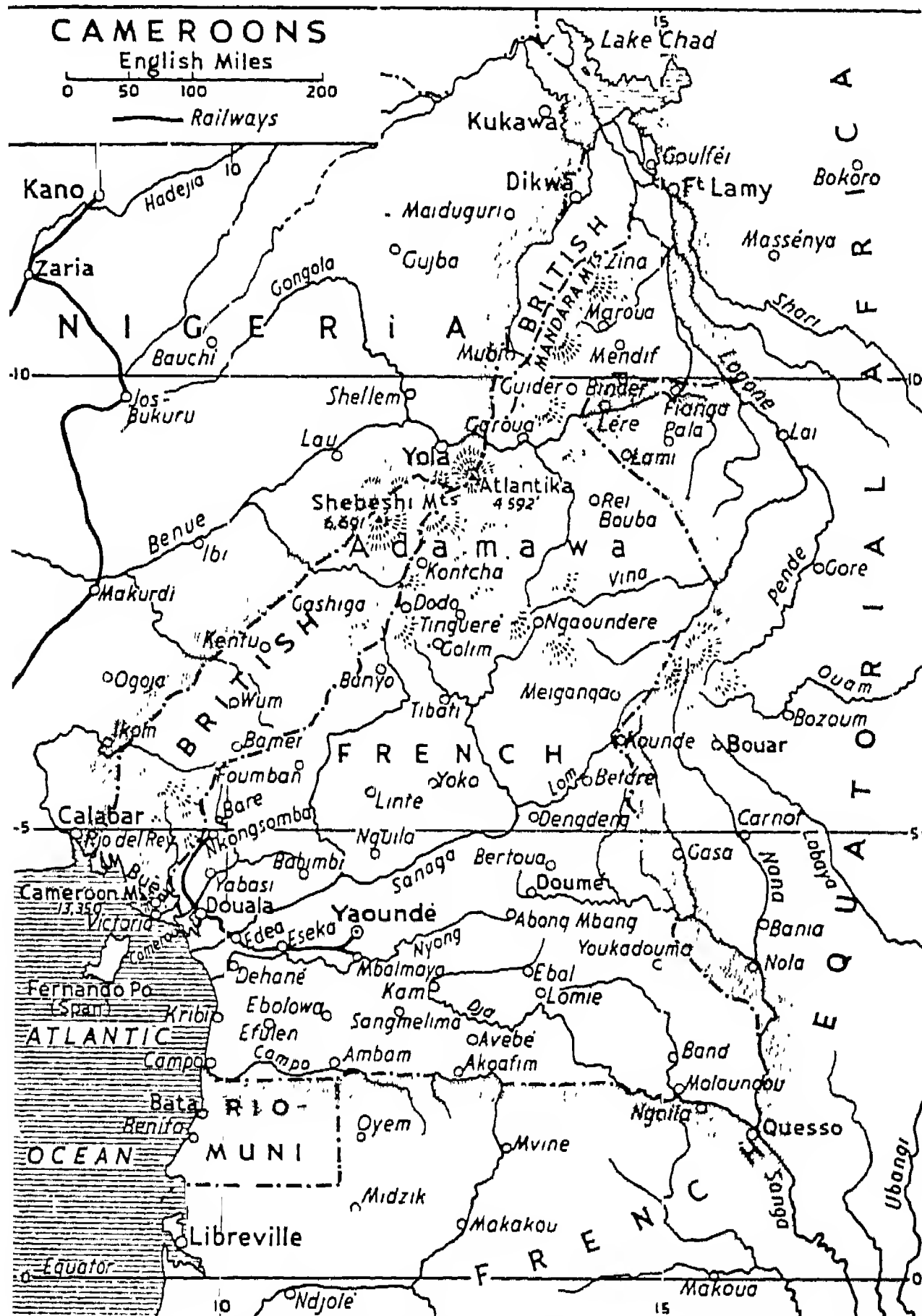
Cameronians' regimental badge

they beat back a desperate attack made by the Highlanders. Enrolled in the regular army as the 26th regiment of the line, they fought in Marlborough's great battles. The 2nd battalion—the old 90th—was raised in 1794, and fought in Egypt and at Corunna. In the Crimea the battalion took part in the assault on the Redan, and in India marched with Havelock to relieve Lucknow. The regiment also fought in Abyssinia and Zululand, and through the South African War.

Twenty-seven battalions of the Cameronians served in the First Great War, fighting on three battle fronts and earning the following battle-honours: Mons; Marne, 1914, 1918; Neuve Chapelle; Loos; Somme, 1916, 1918; Ypres, 1917, 1918; Hindenburg Line; Macedonia, 1915, 1918; Gallipoli, 1915–1916; and Palestine 1917–1918. In the Second Great War, battalions served in France 1939–40, throughout the Burma campaigns, and in France and Germany 1944–45.

Cameroons. Country of W. Africa. Formerly a German protectorate, it was mandated to the U.K. and France, 1922, placed by them under U.N. trusteeship 1946. It is bounded on the W. by the Bight of Biafra, N.W. by Nigeria, E. and S. by French Equatorial Africa, S. by Spanish Guinea (Rio Muni) and French Gabun. In 1911 the boundaries were arranged by treaty between France and Germany so that German territory should reach the navigable waters of the Congo system at two points, viz., on the Ubangi and Congo rivers, and also so as to surround the small Spanish colony of Rio Muni on its landward sides.

Cameroons forms a rough triangle, with its apex resting on



Cameroons. Map of the West African country, formerly a German protectorate, divided in 1919 between Great Britain and France



Cameroons, West Africa. 1. "Massa" houses, built entirely of agglomerations of clay by the Moundangs, who live on the banks of the Logone. 2. General view of the wharf and harbour at Douala, a seaport of the French territory. 3. Constructing a large building with raffia palm. 4. Typical Cameroons homestead near Buea

Lake Chad in the N. and its base on the Gabon colony. From N. to S. it is about 990 m. long, and from W. to E. about 600 m. broad in the widest parts. The area is 200,000 sq. m. and the pop. about 4,600,000.

The country as a whole is mountainous, and forms the N.W. limit of the central African plateau. The coastal districts are broken by deep inlets and estuaries N. of the Sanaga river, the chief of which are the Cameroons estuary, Ambas Bay, and the Rio-del-Rey. North of the Cameroons estuary is the Cameroons group of mts., which rise to a height of 13,350 ft. in the peak of Mongo-ma-Lobah. On its slopes is Buea, the former administrative capital. Running generally N.E. is a series of mt. groups forming the broken borderlands of Nigeria, to the S.E. of which lies the Cameroons plateau, the largest and most important part of the country. Farther N. is Adamawa, an enormous region stretching as far as the swampy lands of the Lake Chad basin. The S. is broken by numerous ranges, but is generally a large plateau containing the sources of numerous rivers running

S. to the Congo. The principal rivers are the Logone and its tributaries, running N. to the Shari, which falls into Lake Chad, and forms the N.E. boundary of the territory; the Benue, rising in Adamawa and flowing S.W. through Nigeria to the Gulf of Guinea; the Sanga, flowing from the central plateau to the Congo, with its tributaries, the Mambere and Dscha; and the Sanaga, Nyong, and Campo, flowing W. to the Bight of Biafra.

In the coastal regions the climate is hot and moist, with a high rainfall, up to 430 ins. annually; in the interior average temperature ranges up to 90° F. Agriculturally Cameroons is a rich country; oil-palms, rubber, kola nuts, and coconuts flourish, and large quantities of cassava, plantains, rice, cocoa, maize, yams, millet, ground-nuts, cotton, and tropical fruits are grown. The inhabitants include the Bantu-speaking people of the coastal regions, long in contact with European civilization, the Muslim peoples of the N., and aboriginal tribes of certain parts of the interior.

Before the German occupation in 1884 little was known of the country, with the exception of the coastal districts. The Portuguese had visited and named the Cameroons estuary in the 15th century, the word Cameroons being derived from Camarões, meaning prawns. The northern districts were first explored by way of Lake Chad and the Benue river. Burton explored the Cameroons region proper in 1861-62, and Buchholz, Reichenow, and Lüders explored the interior in 1872-75. Many other expeditions, notably those of Rogozinsky in 1883, followed.

On the coast the Baptist Missionary Society established their missions, and when Dr. Nachtigal raised the German flag on July 14, 1884, British interests appeared to be well established, King Akwa, the principal Douala chief, having asked for British protection on Aug. 7, 1879. Several risings occurred before German rule was recognized but they were spasmodic and unorganized.

Under German rule there was considerable economic progress, exports exceeding a million pounds by 1912. The Germans favoured

the system of cultivation by plantations. But transport remained more undeveloped than in any other African colony. Two rlys. covered some 450 m. and a single road was under construction from Douala to Lake Chad.

Within a week of the outbreak of the First Great War in 1914, French forces captured German posts in Cameroons. British troops moved in from Nigeria and occupied Tepe on the Benue river, but were repulsed on Aug. 25. The Royal Navy bombarded Douala, which soon surrendered, as did Bonaberi. An Anglo-French force under General Dobell seized Edea on Oct. 26. Early in 1915 the Germans, having lost most of their stations and rly. lines, counter-attacked and gained local successes; but the French took Lomie in the S. on June 25; and in Oct. Dobell advanced from Edea towards Yaoundé, the chief German stronghold. Belgian and Indian troops had been added to the Allied force: its progress was contested, not unskilfully, but it met no serious check and entered Yaoundé on the first day of 1916. With the fall of Mora, after a gallant defence, on Feb. 18 the Allied conquest was complete. By the treaty of Versailles the country was divided in 1919 between Great Britain and France, to be administered under League of Nations mandate. France and the U.K. in 1946 placed their Cameroons territories under U.N. trusteeship.

BRITISH CAMEROONS territory lies in two strips along the boundary with Nigeria (see map in page 1676). Area 34,081 sq. m. Pop. (1953 est.) 1,430,000. The whole territory was administered as part of Nigeria from 1946 until the Nigerian (Constitution) order in council of 1954 set up a separate govt. for the S. section, the N. remaining part of the Northern Region of Nigeria. Both N. and S. send elected members to the federal house of representatives of Nigeria.

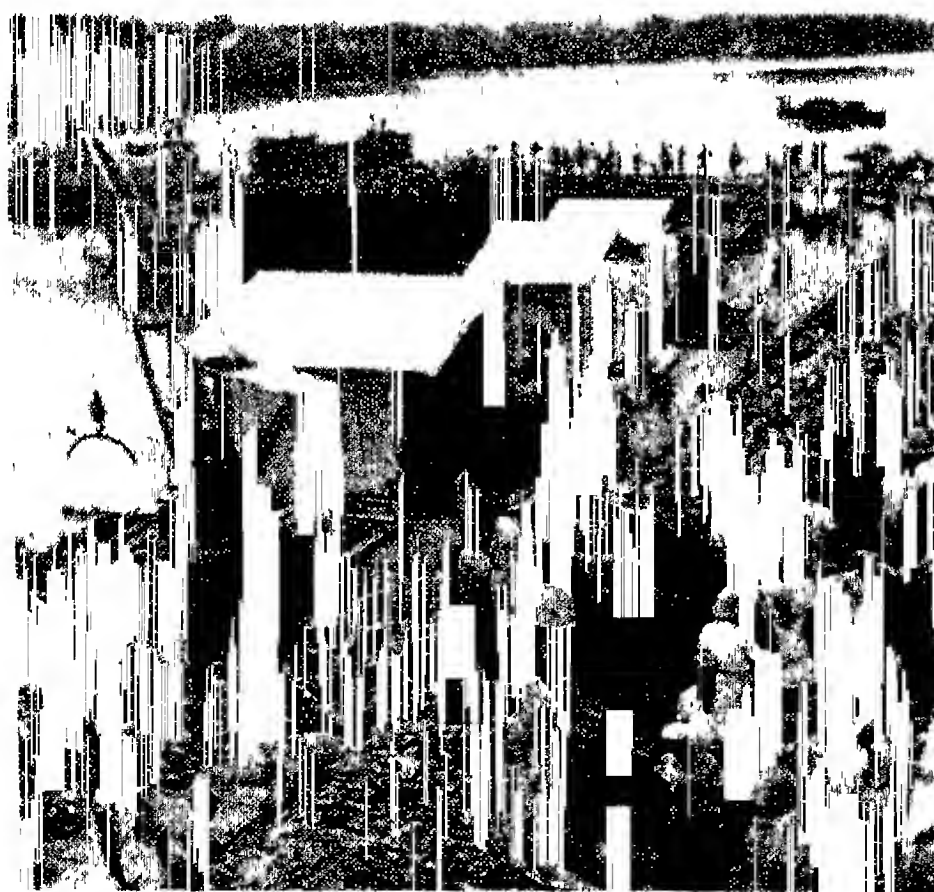
Exports include bananas, rubber, cocoa, palm produce, coffee, ground nuts, hides and skins. Principal ports are Bota, Victoria,

and Tiko; Tiko has direct sea communication with the U.K. and is linked by air with Lagos and other Nigerian cities. Mamfe and Kumba are the largest inland towns. Road transport is being developed, and the southern Cameroons road system is connected with those of Nigeria and French Cameroons. There are a number of govt. primary and secondary schools, hospitals, and dispensaries.

FRENCH CAMEROONS territory, area 167,000 sq. m., pop. (1954 est.) 3,115,600 (12,200 Europeans), is administered from Yaoundé on the central plain (pop. 36,000). Both in government and in finance there is autonomy. Douala is the chief seaport, and until 1921 was the centre of administration.

There are few minerals or manufactures, the chief products being ground nuts, palm oil, almonds, hides, timber, cacao, coffee, and ivory. Cattle-rearing flourishes. There are 314 m. of rly. and 7,000 m. of road. Primary, secondary, and technical education is provided.

During the Second Great War the French Cameroons declared their adherence to Gen. de Gaulle on Aug. 29, 1940. Between then and March, 1942, great strategic roads were built, linking the port of Douala with Khartum, the southern Sudan, and Juba. These roads provided a means by which the Allies could be supplied and reinforced in Egypt and the Near East without use of the long and hazardous route round the Cape.



British Cameroons. Shipping bananas from the port of Tiko, on the Gulf of Guinea

Consult The Cameroons and Togoland, R. R. Kuczynski, 1939.

Cametá. Town of Brazil, in the state of Pará. It is on the W. bank of the Tocantins estuary,

85 m. S.W. of Belém, and is the centre of a cocoa-growing district.

Camiling. Town of Luzon, Philippine Islands, in the prov. of Tarlac. On the Camiling river, 25 m. S. of Lingayen, and about 80 m. N.N.W. of Manila, it trades in timber, rice, sugar, maize, and cotton.

Camilla. In Roman legend, daughter of the Volscian king Metabus. Brought up by her father as a handmaid of Diana, she was famed for her fleetness of foot. In Virgil's Aeneid (xi) she espouses the cause of Turnus against Aeneas, by one of whose supporters, Aruns, she was slain in battle.

Camillus, MARCUS FURIUS (d. c. 365 B.C.). A hero of the early Roman Republic. He is said to have been dictator five times, and consular tribune in six different years, besides holding other magistracies. After a ten years' siege he took the city of Veii, but being accused of an unjust distribution of the booty, went into exile. When the Gauls under Brennus had occupied all Rome except the Capitol, 390, and the Romans were about to buy off the invaders, Camillus suddenly appeared, refused his assent to the arrangement, and drove the Gauls out of Rome, on which he was hailed as a second Romulus. Although a patrician, Camillus recognized the claims of the plebeians to political equality.

In ancient Roman times Camillus and Camilla were the names given to the boys and girls who acted as attendants at religious and sacrificial rites. They had to be children of free parents.

Camiri. Town of S.E. Bolivia, divisional h.q. of one of the military districts of the country. The junction of all-weather highway systems from Sucre and Santa Cruz, Camiri was planned to aid in the development of the oilfields of this region and to provide means of transporting oil from the rich region in the Bolivian Chaco, among the world's richest reserves of petroleum. Camiri is also connected by rly. with Sucre, and by pipe-line with Sucre and Cochabamba. Pop. (1949 est.) 3,700.

Camisards. Name given to the Protestants of the Cévennes in France. The Revocation of the Edict of Nantes by Louis XIV in 1685, by depriving them of their liberty of conscience, roused them to revolt. For a few years the rebellion smouldered; then, in July, 1702, it broke violently into the open in the Lozère with the murder of Esprit Séguier of the abbé du Chayla, the implacable

enemy of the Calvinists. Louis XIV sent a formidable army to subdue the insurgents. Jean Cavalier, a former shepherd, Roland, and others led the Camisards in a guerrilla war that kept the king's 20,000 men at bay for two years. On both sides the war was waged with the utmost cruelty. Men were tortured, women and children massacred. In 1704 the superior strength of the state began to tell, and Marshal Villars persuaded Cavalier to accept a peace. Cavalier's partisans disapproved of its terms, and the hopeless struggle continued. It ended in 1713 in the complete defeat of the Camisards. Cavalier escaped to Switzerland; he offered his services to the duke of Savoy who appointed him colonel. He fought in Spain; he went later to the Netherlands where a Dutch lady paid his debts and married him; to Ireland where, now a widower, he married a French girl of a poor but noble family. King George II of England appointed him brigadier-general and governor of the isle of Jersey.

The name Camisards comes from an old French word *camisade* meaning an attack in the dark, when a shirt (*camise*) was worn over the armour so that comrades could recognize one another. *Consult Camisards et Dragons du Roi*, Agnès de la Gorce, 1950.

Camlet (Arab. *khamlat*, nap, pile). Term originally applied to certain costly Oriental fabrics. There is no proof that the stuff was made of camel's hair, though it is early associated by Europeans with the camel. The earliest camlets seem to have been rich, fleecy fabrics made from the wool of the Angora goat.

The word is variously spelt. Camblet, camolet, chamlet, are found, those forms beginning with "ch" being more general until the reign of Charles II. In 1664 Pepys refers in his diary to his "new camelott suit." The earliest known mention of English-made camlets is in 1610, in reference to the industry at Coventry.

Camm, SIR SYDNEY (b. 1893). British aircraft designer. As a young man he worked at Martinsyde's workshops and subsequently founded the Windsor model aeroplane club. Designer of the Hawker Hurricane single-seat fighter aircraft, he evolved the first of this type in 1933, and the first 8-gun fighter to be used by the R.A.F., 1937. He became director and chief designer of Hawker Aircraft, Ltd., and in 1953 was knighted.

Cammaerts, ÉMILE (1878-1953). Belgian writer. Born in Brussels, March 16, 1878, he settled in England in 1908, and was professor of Belgian studies and institutions at London University 1931-47. His earlier works as writer included translations from



Émile Cammaerts,
Belgian writer

Ruskin into French, and essays in art criticism, *Les Bellini*. During the First Great War his poems, inspired by fervent patriotism and tender religious sentiment, exercised considerable influence among Belgian, French, and English readers, being for the most part translated into English by the poet's wife, Tita Brandes Cammaerts. His works included *Belgian Poems*, 1915; *Messines and other poems*, 1918; a summary account of Belgium's suffering and courage in *Through the Iron Bars*, 1917; *Intimate Poems*, 1922; *The Treasure House of Belgium*, 1924; *Rubens, Painter and Diplomat*, 1931; *Albert of Belgium*, 1935; *Upon This Rock*, 1942; *The Flower of Grass*, 1944. He died at Radlett, Herts, Nov. 2, 1953.

Camoens OR CAMOËS, LUÍS VAZ DE (1524-80). Portuguese poet, renowned as one of the greatest epic and lyric poets of 16th-century Europe. Of a noble though impoverished family, one of whose forebears was a Galician troubadour who had settled in Portugal, he was born in Lisbon in 1524; he was related to Vasco da Gama (q.v.). He was educated at Coimbra, acquiring there an ample knowledge of the classics. In his 20th year he appeared at court, where it is believed he fell in love with one of the queen's ladies-in-waiting, Caterina de Ataíde, whose father disapproved of a union between them. He was banished from the capital in 1546, possibly as a result of continuing to pay court to Dona Caterina. By this time he had already composed three plays, and many lyrics sufficient in themselves to have established him as one of the greatest poets of Portugal. In 1547 Camoens fought in North Africa

as an ordinary soldier, and lost an eye at Ceuta. In 1549 or 1550 he returned to Lisbon, where he led a disorderly life which culminated in his wounding a man in a brawl

in June, 1552, for which he was imprisoned. Pardoned in March, 1553, on condition that he served in India, he sailed the same month and arrived in Goa in Sept. On the way to take up an appointment in Macao in 1556 he stopped in the Moluccas for a year. After two years in Macao, as a result of charges brought against him by colonists, he was put on board a ship bound for Goa. Shipwrecked on the way, he managed to swim ashore carrying the MS. of *Os Lusíadas*, the great work on which he had never ceased to work since before he left Portugal. Reaching Goa in June, 1561, he was imprisoned but soon released. Nothing is known of his life for the next few years. In 1567 he started homewards, accompanying the governor of Goa to Mozambique, where he had to remain for two years afflicted by poverty and sickness. Through the good offices of friends he was enabled to start off again, reaching Lisbon in 1570, after an absence of 17 years. His *Os Lusíadas* (the *Lusiads*) was published in 1572, and the king, Sebastian, rewarded him with a very small pension. From his return he lived in poverty with his aged mother, and having caught the plague died in Lisbon June 10, 1580.



Luis de Camoens,
Portuguese poet

Camomile OR CHAMOMILE (Gr. *chamaimelon*, earth-apple). Perennial dwarf herb of the family Compositae native to west Europe (including Britain), North Africa, and the Azores. Called botanically *Anthemis nobilis*, it has a short, branched, creeping rootstock and erect, branching hairy stems. The compound leaves are much di-



Camomile, the flower of which
is used medicinally

vided with almost thread-like leaflets. The whole plant is strongly aromatic. The daisy-like flower heads, borne singly on long stalks, have yellow tubular florets in the centre surrounded by strap-shaped

white ray florets. The dried ripe flower heads contain a volatile oil used in doses of $\frac{1}{2}$ to 3 minims to stimulate the digestive processes.

Other British species are: the corn camomile (*A. arvensis*), an annual weed of arable land and waste places; yellow camomile (*A. tinctoria*) with yellow ray florets, an introduced species from central Europe and Scandinavia; *A. cotula*, another common weed of waste places (the stinking may weed).

Camorra. Italian secret society. Founded in Naples in the mid-16th century, as a political association, it had a highly centralised hierarchic organization and imposed rigorous tests upon candidates for admission who were often required to perform some dangerous or violent deed. The Camorra's period of greatest political influence was during the Bourbon tyranny of the Two Sicilies (1738-1869), and it was used by the administration of Francis II as a form of secret police. After the European revolution of 1848 the society tended to identify itself with the liberal movement which in 1860 overthrew the Bourbons and achieved the unification of Italy. The Camorra's persistent attempts to influence the new Italian govt. in favour of its members caused Garibaldi to proscribe it and it was driven underground. Thereafter the society degenerated into a criminal organization levying blackmail in return for its protection. Successive Italian govts. tried to suppress the Camorra, but nothing successful was achieved until 1911, when 37 Camorristi were put on trial for the murder of two of their associates and nine were found guilty. Since then the power of the society has declined. *Consult* Secret Societies of all Ages, C. W. Hecklethorne, 1897.

Camouflage (Fr. *camouflet*, smoke-puff). The art of being or making inconspicuous. There are two kinds of camouflage: natural camouflage, as by certain animals, birds, insects, and even flowers (see Protective Coloration); and military camouflage. Military camouflage is probably as old as warfare: a man about to attack another would naturally try to conceal himself, preferably by merging with his surroundings, before coming to grips with his foe, while the man liable to attack would similarly seek concealment. Most primitive people are adept at concealing themselves in warfare or when hunting; the Red Indians of N. America were expert exponents of so camouflaging them-

selves that they merged into the surrounding landscape.

Throughout military history there are many examples of concealment by deceptive camouflage, but nearly always of a temporary or makeshift nature. It was not until the First Great War that camouflage developed into established military practice by land, sea, and air. As practised in the two Great Wars, camouflage was based on set principles enunciated by Abbot Thayers (1849-1921), an American artist and naturalist who had developed a theory of protective coloration of animals. The First Great War introduced the use of aircraft for reconnaissance and observation of ground forces and it became essential for troops, artillery, and positions to be given some form of concealment. Thayers happened to be in England in 1915 and he persuaded the British War office to adapt his theories of animal protective coloration to the concealment of infantry and artillery; the Royal Navy later took up the idea and from it developed the technique of dazzle painting for ships. By the end of the First Great War camouflage had become a recognized branch of military science and in the British army was the responsibility of the Royal Engineers, while a special Admiralty branch dealt with naval camouflage. In the Second Great War, camouflage was still further developed, more particularly as concealment from air observation.

Primarily, the object of military camouflage is to delay recognition by an enemy. It is not normally possible to make concealment so perfect that it cannot be penetrated by deliberate search at close range. But it can delay recognition long enough to confuse the attacker's aim. It may not defeat the careful examination of an aerial photograph, but it may delay recognition in a mass of such photographs which cannot all be carefully examined by a photo interpreter in limited time.

PROCESS OF DETECTION. The detection of a feature is due first to the attention being attracted by some conspicuous detail such as a patch of light colour. The attention is then concentrated on this area and recognition is achieved under closer examination.

In normal daylight the power of recognition is enormously increased when the gaze is directed accurately at the target; for the cells of the eye by which daylight vision is achieved are concentrated at the centre of the field of

view. At night, vision is achieved by different cells which are not concentrated at the centre of the field. Although by daylight it is best to look directly towards the object being examined, at night the vision should be directed some 6 degrees (the width of the hand at arm's length) away from the expected position.

A feature is revealed by contrasts of its colour or tone with those of the background. In most landscapes contrasts of tone (brightness or darkness) are more conspicuous than contrasts of colour. Light areas stand out more clearly than do those which are darker than the general tone. The brightness of a surface varies considerably according to the direction from which it is viewed in relation to the light. Most natural surfaces are rough. Their brightness is, therefore, nearly the same for all directions of lighting. Artificial surfaces, such as roofs, roads, pathways, etc., are much smoother and will, therefore, shine and give bright tone when seen towards the principal source of light. A shining surface is usually more conspicuous than any other feature in a landscape. This is specially important in moonlight, when most of the landscape is dark.

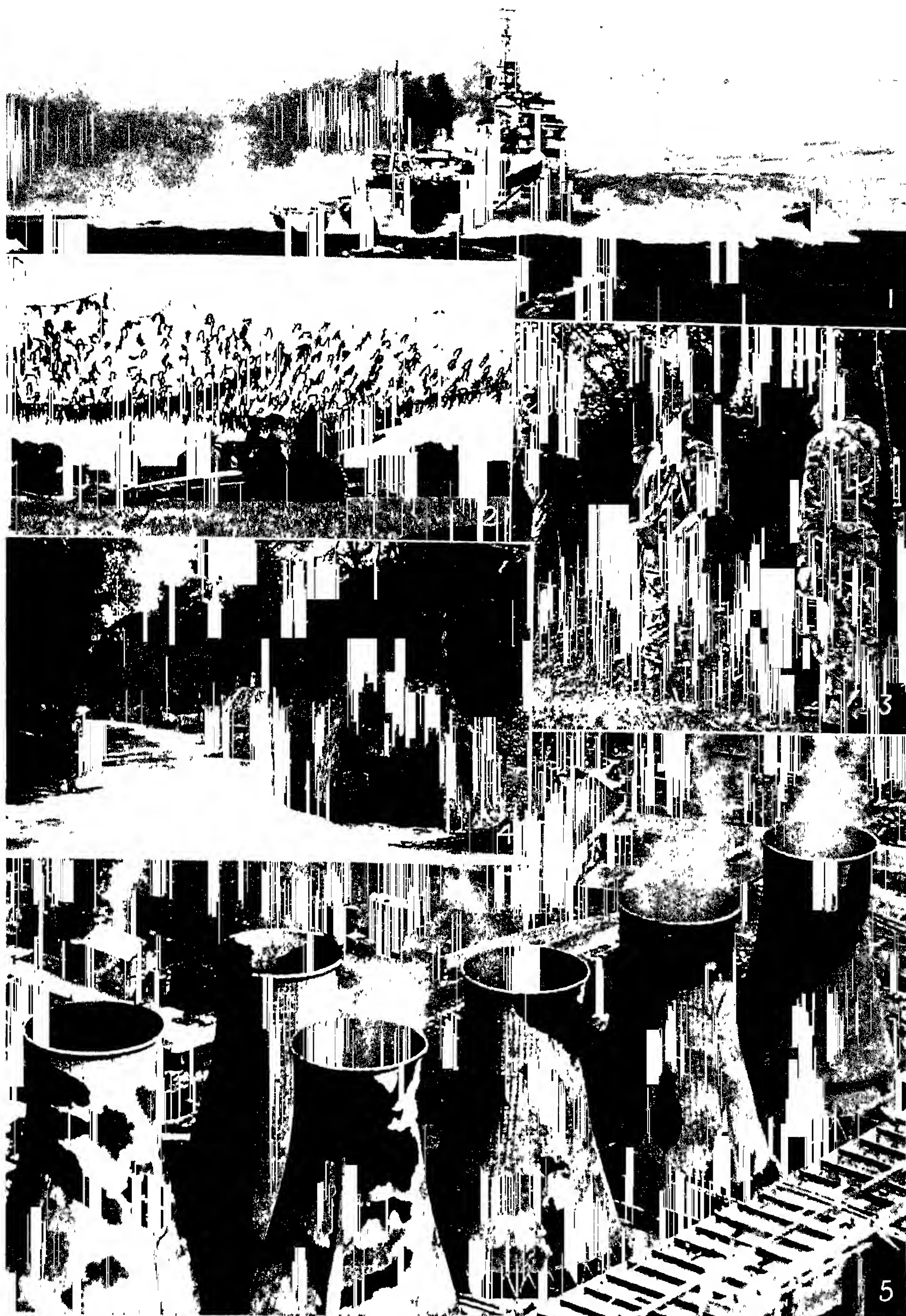
Shapes Revealed by Shadows

The shape of an object which stands up above the surface of the ground is often revealed by the shadow thrown on the ground and the darkness of the surfaces which are not directly illuminated by the sun or moon. The outline of a strongly illuminated object seen against the shadow background may be most revealing.

The underneath surface of an animal is less strongly illuminated than the upper surface. In order that the animal should not be conspicuous against a uniform background, its back is much darker than its under-surface. Although this method of counter-shading is of great importance in animal camouflage, it has little application to buildings.

At night, even in the strongest moonlight, colour is scarcely perceptible, and it is differences of tone which are important. Mist and the effect of distance also reduce the importance of colour. The shine of a surface when seen towards the light is, therefore, a matter of the greatest importance.

The scars made by excavation, or by spreading soil over the surface of the ground, cause



1. Battleship H.M.S. Anson, so camouflaged as to be effectively concealed in a heavy sea. 2. Netting interwoven with fabric is employed to screen this small gun-position from aerial view. 3. U.S. troops, wearing

painted overalls during the advance on Brest in 1944. 4. Tanks, covered with nets, parked by the roadside. 5. Cooling towers of the Leicester electricity works, painted to look from the air like groups of trees

CAMOUFLAGE: METHODS OF CONCEALMENT ON SEA AND LAND

Photos, 1 and 4, British Official; 2 and 5, Fox; 3, Associated Press

patches of light tone which attract attention. The best treatment for them is to grow grass or other vegetation, but this is difficult unless the top soil has been preserved to cover the unfertile material. Concrete roadways and other paved areas, by reason of their shine, constitute one of the main problems of concealment.

Methods of Concealment

To make an artificial surface difficult to distinguish from its surroundings the colour must be approximately correct and the nature of the surface made to correspond fairly well with the natural surface surrounding it, so that the effective tone will vary as does that of the natural surfaces when seen in all directions and in all strengths of illumination. The roughening of a surface to achieve this result is referred to as "texturing."

The outline of an object may be broken up and disguised partly by introducing dark textured areas upon the top of the object in a pattern which will best break the outline; or it may be necessary to introduce areas of netting to achieve the same result. The design of the pattern introduced should normally be one in which the prominent lines lie at right angles to the contours of the object to be concealed. If the background itself has a prominent pattern, the same general pattern should be carried over the object so as to give no conspicuous change. This method is seen clearly in the camouflage of animals such as the zebra.

Concealment of Standing Aircraft

The possibility of concealing an object depends greatly upon the nature of the background against which it is seen. A dark coin dropped on a light plain carpet is easily seen. It may be exceptionally hard to find on a carpet which has a varied pattern. On such a background the dark coin may most easily be found by looking towards the principal source of light, so that the surface of the coin, being smooth, will shine out by contrast against the rough surface of the carpet. Aircraft standing on the uniform surface of an aerodrome are difficult to conceal, partly by reason of the shine from their upper surfaces and partly by reason of the shadow which they throw. The most satisfactory method is to introduce dark patches on the ground where the aircraft are to stand and then to cover the surfaces of the aircraft with a dark netting.

If the dark patch is suitably placed, it is difficult to distinguish from thickets which may exist. Even if the patch is known to be artificial, it is difficult for the attacking airman to tell quickly whether there is an aircraft standing upon it. Neither the shadow of the aircraft nor the surfaces of the wings which are covered with a dark net will show up against the dark ground patch.

Camouflaging a Factory

The concealment of a factory depends very largely upon the nature of the area in which it is placed. A great deal, therefore, depends upon the selection of the site and the layout of the buildings. A large factory in a built-up area may be disguised by painting it in a pattern of small houses to make it inconspicuous in the housing which surrounds it. The same factory in an open area would need entirely different treatment. It is probable that the built-up area could be identified by aircraft and the general position of the factory in that area could be fixed with sufficient certainty to allow an attack of reasonable accuracy to be made. The detection of a site in open country is much more difficult to achieve, and provided the site is not in known relation to prominent landmarks, concealment is comparatively easy. The general pattern of the background should be carried over the factory and the outline of the buildings should be broken up by introducing dark textured areas to break up the shadow outlines which will exist under certain conditions of lighting.

The effective tone of a rough surface depends largely upon the shape of the surface particles and the shadow thrown by them. If the particles are translucent, the effect of shadow will be less pronounced. The brightness of grass is, therefore, little changed by the direction of light. On the other hand, a surface with a granular texture may appear too dark when seen up-sun. The extent of texturing must, therefore, be adjusted to resemble that of the surrounding area unless contrasts of tone are desirable to develop a desired pattern.

Nets garnished with fabric have been used in military operations to conceal comparatively small targets. They have also been used in large areas to cover important targets of much larger size where good concealment was specially important. The cost of the netting and the structure to

support it was great, and the time needed for installation and maintenance was an important factor. The use of extensive net coverage was, therefore, strictly limited. The proportion of fabric to open space in the net could be varied so as to give the right proportion of shadow and thereby simulate a surface of appropriate tone.

The completeness of concealment which can be achieved depends greatly upon the extent of the work carried out. In using the limited resources available for camouflage during the Second Great War it was, therefore, necessary to determine the relative importance of various targets, the nature of the attack likely to be delivered, and whether the attack would be by day or night. Certain targets, although of exceptional importance, were in positions which could not be effectively concealed by reasonable means. Other targets were in areas unlikely to be attacked except by night. The assessment of targets according to their importance and the likelihood of attack was, therefore, the most important factor in directing the use of limited resources to best advantage.

Difficulty of Hiding Landmarks

The concealment of landmarks which might assist the attacker in fixing the position of his target may be as important as the concealment of the target itself. Landmarks, to be effective for this purpose, must necessarily be large and conspicuous. Concealment, therefore, presents great difficulties. Although in fixing the sites for important targets prominent landmarks were avoided as far as possible, it was not usually practicable to treat landmarks themselves by camouflage processes. Large lakes of distinctive shape were drained because when shining in the moonlight they constituted landmarks of exceptional importance. Arrangements were also made to darken plumes of white smoke and steam so that they were less conspicuous against the general dark background.

The existence of camouflage greatly decreased the anxiety and therefore improved the efficiency of those protected by it during the long-continued raiding seasons. Little, if any, British camouflage was done for that reason alone. A great deal of camouflage was done by the enemy in Germany and also in the occupied territories in positions which could so easily be found that it did not appreciably increase the operational diffi-

culty of attack. Its psychological value may have amply justified the use of labour and materials which were more easily available than in Great Britain.

Camoy's, BARON. English title borne by the family of Stonor. Its first holder was Sir Thomas Camoy's, who fought at Agincourt and died in 1421. After his grandson, the 2nd baron, died in 1426, the title was in abeyance over 400 years. In 1839 it was revived for Thomas Stonor, a descendant of the 2nd baron's daughter, and Ralph, the 5th baron (b. 1884, succeeded his father 1897), is his descendant. The family is an old Roman Catholic one, with its seat at Stonor, Oxon. The title dates from 1383 for purposes of precedence.

Camp (Lat. *campus*, a field). Group of tents or buildings for the accommodation of a body of people, usually military. Temporary camps usually consist of tents laid out in lines, and can be moved at a few hours' notice, the troops taking their accommodation with them. More permanent camps consist of rows of huts built of timber, asbestos, or corrugated iron; the latter are in the form of a half cylinder and known as Nissen huts. Certain military centres comprising stone or brick-built buildings are known as standing camps, e.g. Aldershot (q.v.), Catterick, Strensall.

The Roman camp was laid out in the form of a square, as a rule fronting the east, and protected by a rampart (*vallum*) and a ditch (*fossa*). It was divided into two parts by a broad road (*via principalis*) running parallel with the front, terminating in two gates, *porta principalis dextra* (on the right) and *porta principalis sinistra* (on the left). The *via principalis* itself was cut at right angles by the *via praetoria*, at the end of which were the *porta praetoria* on the front and the *porta decumana* in the rear. The larger division of the camp, that towards the rear, contained the tents of the legions and the allied contingents (*socii*); at the junction of the *via principalis* and the *via praetoria* was the *praetorium*, the tent of the commander-in-chief; *principia*, the quarters of the chief officers (*principes*); the altar on which the general offered sacrifice; the *tribunal*, from which he addressed the troops or pronounced sentences; the *quaestorium*, or paymasters' quarters; the *augurale*, where the auspices were taken. The light-armed auxiliary forces were quar-

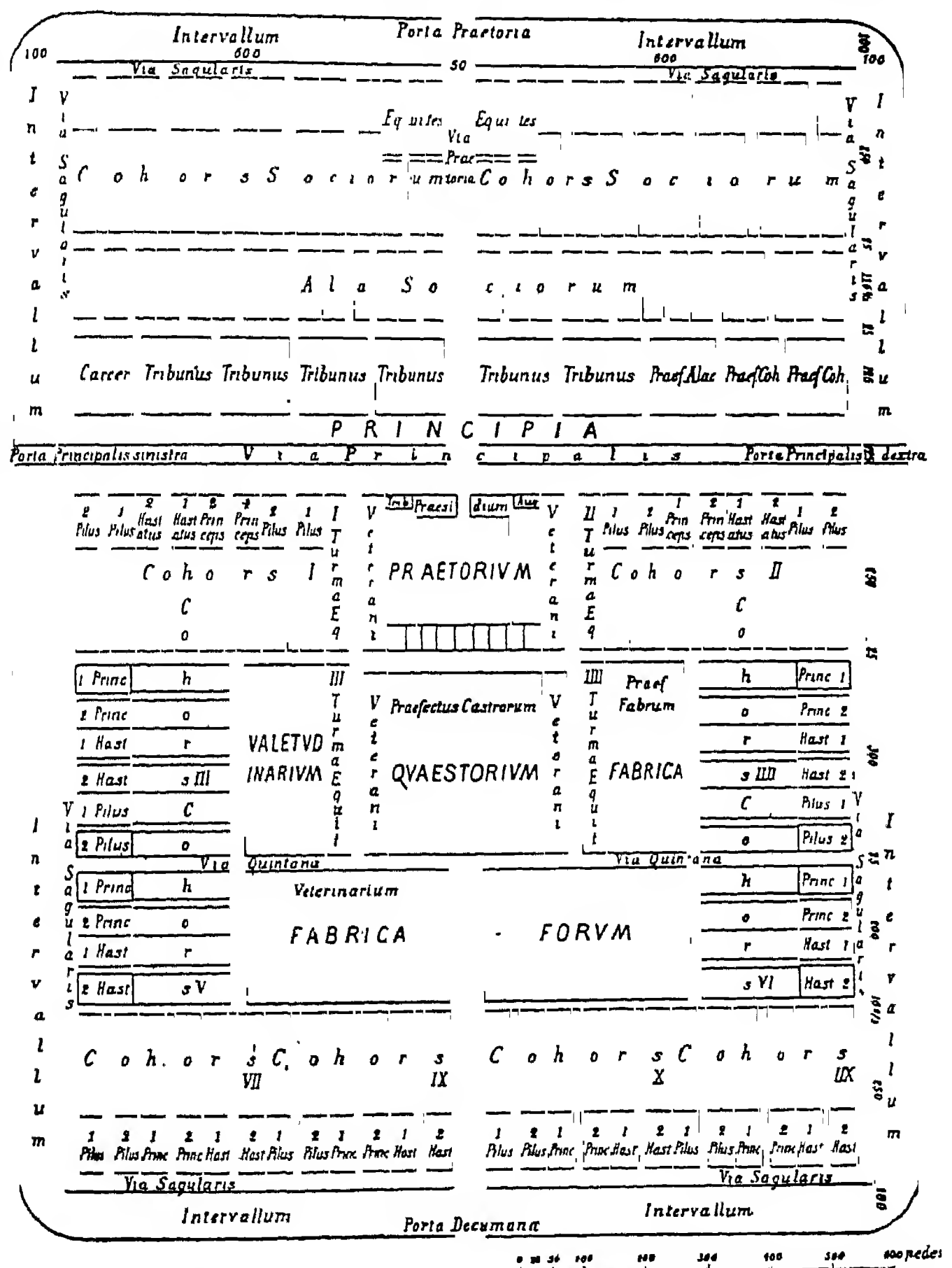
tered in front. In the figure, *hast.* (= *hastati*), *princ.* (= *principes*), *pilus* (also called *triarii*) indicate the first, second, and third lines of the infantry. On both sides of the *praetorium* and *quaestorium* are squadrons of cavalry (*turmae equitum*). *Valetudinarium* is the infirmary; *veterinarium*, the hospital for horses and mules; *praefectus castrorum* and *p. fabrum* show the quarters of the officers roughly corresponding to quartermaster and chief engineer. The camp of the standing armies of imperial times was virtually a fortified barracks. Examples are the camp of the praetorian guards at Rome and that of the 3rd legion at Lambaesa in Africa, of which many traces remain.

British troops engaged on punitive expeditions, as in certain colonial wars, formed a perimeter camp, the sleeping accommodation being surrounded by a parapet.

If horse or pack transport was used, the wagons were formed into a square, axle to axle, with the shafts pointing outwards. The loads were taken off the animals and built up into a defensive perimeter.

In the N. Africa campaigns of the Second Great War, the desert armies camped in laager. When an armoured formation laagered, the fighting vehicles were drawn up in parallel columns with their "soft-skinned" transport and troop-carriers parked inside the lines. Tanks on the flanking columns had their guns swung outwards to meet any sudden night attack, and the rear of the laager was protected by a line of anti-tank guns. While in laager, the fighting vehicles were replenished with fuel and ammunition.

An entrenched camp is an improvised fortress set up by troops awaiting reinforcements or a favourable turn in a campaign.



Camp. Plan of the camp at Novaesium (Neuss), a typical example of a Roman military camp in the 1st century A.D.

A typical example was that established for the defence of Tobruk in 1941, where the perimeter was strongly fortified with machine-gun posts and surrounded on the landward side with barbed wire and minefields.

During the Second Great War, vast camps were set up throughout Great Britain and N. Ireland to accommodate British and U.S. troops. Most of these camps consisted of hutments, and were, in effect, small townships, having their own water supply, lighting and power plants, concrete roads, and underground drainage systems. They were provided with air raid shelters and elaborately camouflaged to prevent detection from the air. Early in 1944 scores of new camps were established in southern England to accommodate the troops assembling for the invasion of Europe. In the R.A.F. the term camp was generally applied to temporary airfields as distinct from peace-time aerodromes, which are called stations. See Bivouac; Camping; Concentration Camp; Holiday Camp; Internment Camp.

Campagna Romana. Low-lying region surrounding Rome. Mostly an undulating plain, flat and marshy, by the Mediterranean, it rises on the N.E. to the Sabine Hills, and on the S.E. to the Alban Hills, with their crater lakes. Though not unhealthy in Roman times, when it bore numerous towns and villas, it became malarious owing to the arrival at some moment of the anopheles mosquito. Of many attempts to improve soil and climate by drainage and afforestation, those from c. 1925 onwards achieved some success. The soil, composed chiefly of tufa, with lava and peperino, has not been steadily cultivated over long periods in the past. Horses, cattle, buffaloes, sheep, and goats are pastured; hides, wool, cheese, and wine are produced. The inundations of the Tiber, the fumes from the sodden soil, and mosquitoes have completed the ruin begun by the Goths, Vandals, Lombards, Normans, and Saracens, who destroyed the former towns and de-populated the district.

Campaign (late Lat. *campania*, open country). Connected group of military operations which terminate in a decisive result. When hostilities were protracted in a single theatre of war, campaigns tended to become punctuated by the seasons; when severe cold or heavy rains set in

armies went into winter quarters. There were exceptions to this practice, e.g. the winter campaign in the Crimean war, 1854-55.

During the First Great War weather had less effect upon military operations, though major offensives were seldom launched before the spring; and campaigns generally referred to the territorial aspect of the fighting, e.g. E. African, German S.W. African, Mesopotamian, Egyptian, Palestine, Salonika, and Serbian campaigns. The campaigns of the Second Great War were punctuated even less by weather. The Russian campaigns were frequently fought in the depth of winter. The campaigns on N. Africa and Italy, Malaya, Burma, Germany, and the Pacific Islands, were fought in all kinds of weather.

Campaign Stars. Series of stars awarded by the British government for service in the Second Great War. Eight separate stars were issued: 1939-45 Star, Africa Star, Air Crew Europe Star, Atlantic Star, Burma Star, France and Germany Star, Italy Star, Pacific Star. The 1939-45



Campaign Star
of 1939-45

Star, originally 1939-43 Star, was authorised in June, 1943, and was awarded to personnel of the navy, army, air force, and merchant navy with six months' operational service against the enemy, or who had taken part in certain overseas operations of more limited duration. The ribbon consists of equal vertical stripes of red, navy blue, and R.A.F. blue, symbolising the three services. The award was extended in May, 1945, to cover operations up to that date, and is usually worn in conjunction with specific campaign stars. A clasp to the star was awarded to air crews participating in the battle of Britain, 1940.

The eight stars are identical in design, being six-pointed, with the royal cipher surrounded by a band and surmounted by a crown. The star bears on the band the title of the appropriate campaign. They were made by the Royal Mint, and the first were struck in March, 1946. The maximum number of stars that may be held by one recipient is five. Two or more stars are worn from the

centre of the chest leftward: 1939-45; Atlantic; Air Crew Europe; Africa; Pacific; Burma; Italy; France and Germany.

Campanella, TOMMASO (1568-1639). Italian philosopher. Born at Stilo in Calabria, Sept. 5, 1568, he entered the Dominican order, studied at Rome and Padua, and led a wandering life till 1598, when he was arrested by the Spanish government and kept in prison for twenty-seven years. Released through the intervention of Pope Urban VIII, he took refuge in France, and obtained a pension from Richelieu. He endeavoured to prove the existence of God from our idea of Him. The idea of an infinite being cannot proceed from finite beings like ourselves, but only from the infinite being Himself, who must therefore exist. While in prison, Campanella wrote *Civitas Solis* (city of the sun), describing a model state similar to Plato's Republic. He died at Paris, May 21, 1639.



Tommaso Campanella, Italian philosopher

Campania. Region of S.W. Italy. It comprises the provinces of Avellino, Benevento, Caserta, Naples, and Salerno. Except near the coast, it is mountainous; its valleys, especially that of the Volturno river, are among the most fertile in Europe and produce plentifully fruits and vegetables (tomatoes), hemp and tobacco. Area 5,250 sq. m. Pop. (1951) 4,308,408.

It has always been, and still is, one of the most densely populated districts of Italy, having 709 inhabitants to the sq. m. The wheat, wine, and oil of Campania have been celebrated from antiquity. The Regio Felix (fertile district) of the Romans, it included many magnificent villas and pleasure cities, such as Beneventum, Baiæ, Capua, Cumæ, Puteoli, Neapolis (Naples), Herculaneum, Pompeii, Salernum, Stabiae, Nola, and Gaeta. It was colonised by the Greeks, conquered by the Etruscans, the Samnites, and the Romans. Campania is celebrated for its climate and its scenery, its harbours and its people, who retain traces of their Ocean ancestry.

Fighting in the region during the Second Great War is treated under Cassino; Volturno, etc.

Campania. Atlantic liner belonging to the Cunard company. Built in 1893, she made an Atlantic crossing in record time, having a speed of 22 knots. She was 601 ft. long, 65 ft. in beam, and could take 900 passengers. During the First Great War the Campania was taken for naval service as a seaplane-carrying ship. She was sunk in the Firth of Forth after breaking from her moorings during a gale and colliding with a battleship. Nov. 10, 1918.

Another Campania, an escort carrier completed 1944, did good service on Russian convoys during the Second Great War.

Campanile (Lat. *campana*, a bell). Italian name for a bell tower, extended to similar structures outside Italy. Campanili date from the introduction of bells in the 7th century. The typical form of early specimens, to judge from existing remains in Rome, was square, with a perfectly plain outline and no decoration except possibly at the top where the belfry was placed. This pattern was pre-



Campania. Cunard liner built in 1893 and sunk, while on war service, in the Firth of Forth, November 10, 1918

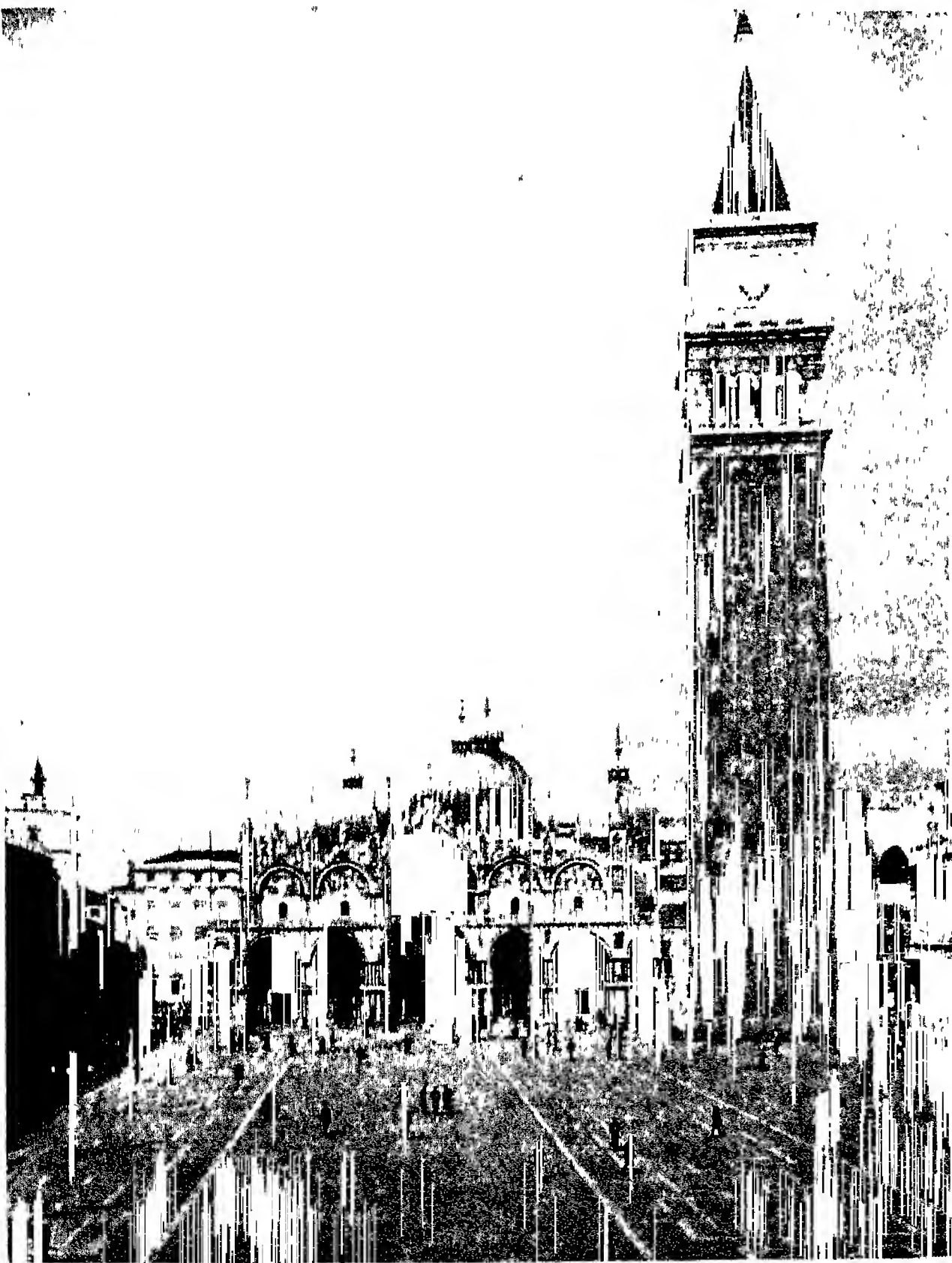
served through the Middle Ages and the Renaissance, and outlasted the latter period. At Ravenna, however, there are cylindrical towers of a date anterior to those at Rome, and the cylindrical campanile of S. Theodoric at Uzès supplies further evidence of this variation in form.

The prevalent shape of the Italian campanile of the later 8th and

early 9th centuries was square and plain except for more or less important string courses (*q.v.*). These are less prominent in most of the later Romanesque campanili of Northern Italy, and they disappear almost entirely from the Venetian campanili of the 13th century and after. Often the sides of the towers were not strictly vertical; those, for example, of the campanile of S. Zeno at Verona have a slight entasis in accordance with the principle of perspective applied to the columns of the Parthenon. Most are pierced with windows, those in the upper part being wider than those near the ground.

One of the largest medieval campanili in the world was that in the Piazza di San Marco at Venice. It was begun about 900 and completed about 1150. In the 16th century it was remodelled, the arcaded belfry being then added. It collapsed July 14, 1902, but was re-erected in 1911 on stronger foundations but according to the original plan. It stood 325 ft. high and was a mixture of early medieval and Renaissance workmanship. In beauty, Giotto Bon-done's campanile at Florence exceeds all others extant. Begun in 1334 under Giotto's direction, it was finished about 1350 by Pisano and others, Giotto being then dead. It is square in plan, 37½ ft. to a side and 275 ft. high. It has five stories and is encased externally in black and white marble and is decorated with reliefs by Giotto, Luca della Robbia, and others. In niches above the reliefs are a number of statues of prophets and patriarchs.

The famous leaning tower of Pisa, which was built during 1174-1350, has a height of 179 ft. from its summit to the ground. Its inclination from the perpendicular is more than 16 ft. and increases very slowly. Cylindrical in form, it is surrounded by eight



Campanile. The old Campanile in the Piazza di San Marco, Venice. It was completed in 1150, but collapsed in 1902, and was rebuilt in 1911

storeys of columns placed one over another. Fine campanili are to be seen near the cathedral at Cremona and in the Piazza dei Signori at Verona. There are a few campanili in Great Britain, notably at Chichester and Wilton.

Campanology (Late Lat. *campana*, a bell; Gk. *logos*, discussion). The study of bells, strictly of their history but commonly understood as the art or science of bell-ringing. The earliest dated English church swinging bell, 1296, is at Cloughton, Lancs; one at Caversfield, near Bicester, Oxon, bearing no date, is believed to have been made about 1200. A pioneer in change ringing, which began in England in the 17th century, was Fabian Stedman of Cambridge, who gave his name to the Stedman change. The earliest societies, e.g. the St. Stephen's Society of Bristol, rang bells up and down in rounds (in regular order); the oldest ringing surviving body for change ringing is the Ancient Society of College Youths, founded in 1637.

Bells are said to be rung in changes when the regular order of striking them is varied. The changes on four bells (rarely rung) are called singles. A peal consists of 5,000 or more non-repeated changes. The number of changes which can be rung in a peal is the continued product of all the natural numbers from one to the number of bells used. Thus, three bells permit of six changes, four bells of 24, and eight of 40,320.

There are many different named methods of ringing changes. The simplest peals are Grandsire on an odd number of bells, Plain Bob on an even number; other favourite methods are Stedman and Treble Bob. Grandsire Triples is rung on eight bells, the changes being rung on the bells one to seven and the tenor or largest always striking in eighth place ("tenor-behind" and "odd-bell" methods). The methods in which the tenor bell changes, i.e. does not always strike in eighth place, are called "even-bell" methods. (For a record peal of bells, see Appleton, Berks.)

The odd-bell methods may be graphically represented thus:

On six bells	Doubles	} Grandsire or Stedman Doubles, Triples, Caters or Cinques
„ eight bells	Triples	
„ ten bells	Caters	
„ twelve bells	Cinques	

The even-bell methods thus:

On six bells	Minor	} Plain Bob Minor, Major, Royal or Maximus
„ eight bells	Major	
„ ten bells	Royal	
„ twelve bells	Maximus	

Campanulaceae. Large family embracing chiefly herbs and a few

shrubs. It includes 53 genera and about 1,000 species, possessing acrid and often poisonous properties.



Campanulaceae. Nettle-leaved campanula, *C. trachelium*

containing many minute seeds. The species are found in all regions, but are most abundant in temperate climates. The principal genera are Lobelia and Campanula. See Bell-flower; Lobelia.

Campbell. Isolated group of islands in the S. Pacific, situated in lat. 52° 34' S. and long. 169° 10' E. They are mountainous and wooded and cover about 95 sq. m. They belong to New Zealand, from which they are distant 145 m., have several good harbours, and a varied flora. They were discovered in 1810 by Captain Hazelburgh.

Campbell. Name of a famous Scottish family, the head of which is the duke of Argyll (*q.v.*). A Celtic word, it means, according to the best authorities, wry mouth. The surname became very general in Argyllshire in the W. highlands, and there were soon numerous branches of the Campbells. Sir Duncan Campbell of Lochow, who was made Lord Campbell in 1445, was the ancestor of the dukes of Argyll and the marquesses of Breadalbane. Other branches are represented by the earls of Loudoun and of Cawdor.

Campbell, JOHN CAMPBELL, 1ST BARON (1779–1861). British lawyer. He was born at Cupar, Fife, Sept. 15, 1779. Educated at Cupar and St. Andrews, where for three years he studied for the ministry, he came to London, 1798. In 1806 he was called to the bar. In 1830 he was returned as Whig M.P. for Stafford, and in 1833 was made solicitor-general. He became attorney-general in 1834, 1835–39, and again in 1840–41, when he was made lord chancellor of Ireland and raised to the peerage. In 1846 he became chancellor of the duchy of Lancaster. In 1850 Campbell was made lord chief justice, and in 1859 attained his ambition of being lord chancellor, a post which he held until his death, June 22, 1861. He was largely responsible for the Municipal Corporations Act of 1835, the Libel Act of 1843, generally known as Lord

Campbell's Act, and much other legislation. He wrote *Lives of the Lord Chancellors, 1845–47*, the last vol., containing Brougham and Lyndhurst, appearing after his death; and *Lives of the Chief Justices of England, 1849–57*. Consult *Life*, ed. M. S. Hardecastle, 1881.

Campbell, ALEXANDER (1788–1866). Founder of the sect known as Disciples of Christ or Campbell-



A. Campbell

ites. Born in co. Antrim, Ireland, Sept. 12, 1788, he emigrated to America in 1809. After some years in the Presbyterian and Baptist ministries he became an independent and itinerant preacher, chiefly in Virginia, Western Pennsylvania, and Ohio. About 1827 his followers formed themselves into a separate society under the title Disciples of Christ, which at the close of the 19th century numbered some 600,000. Campbell died in W. Virginia, March 4, 1866.

Campbell, GORDON (1886–1953). British sailor. Born Jan. 6, 1886, he saw active service 1914–17 during the First Great War, receiving the V.C. in 1917 when commanding the Farnborough (Q 5), one of the ships (see Q-ship) used to counteract German submarines. Commanding the battle cruiser Tiger, 1925–27, and naval A.D.C. to King George V, 1928, he was promoted rear-admiral 1928, vice-admiral 1932. He was National M.P. for Burnley, 1931–35. His books included *My Mystery Ships*, 1928; *Number Thirteen* (autobiography), 1932, and a life of James Cook, 1936. He died Oct. 3, 1953.

Campbell, (IGNATIUS) ROY DUNNACHIE (b. 1901). South African poet. Born at Durban, Oct. 2, 1901, son of a Natal senator, he was educated at the high school there and at Oxford, and was a good Rugby footballer. He enlisted at 15 for the First Great War. Attracted to Provence, he won prizes for bullfighting, at rodeos, and as a jousting, as well as engaging in horse-dealing. Sympathising with fascism, he served in Gen. Franco's army in the Spanish civil war. His poetry, best known in Great Britain by earlier works, e.g. *The Flaming Terapin*, *The Wayzgoose*, *Adamastor*, is rugged and individual in its use of powerful imagery and sharp consonants. *Talking Bronco*, 1946, was highly praised by critics.

Campbell, SIR MALCOLM (1885-1948). British motorist. Born March 11, 1885, he was educated



Sir Malcolm Campbell,
British motorist

at Uppingham and in Germany and France. He began motor racing as a hobby in 1910; some 20 years later he was famous for attacks on the world speed record in his car Blue Bird. He and Henry Segrave (1896-1930) held this record alternately, and on Sept. 3, 1935, Campbell became the first man to drive at 300 m.p.h. Experimenting next with motor boats, he set up at Coniston, Aug. 19, 1939, a world record of 141.74 m.p.h. He was knighted in 1931.

Campbell was a member of Lloyd's, and motoring editor of the Daily Mail. In the First Great War he had been a pilot; in the Second he was attached to the military police. He died Dec. 31, 1948. Among his books are *My 30 Years of Speed*, 1935; *Romance of Motor Racing*, 1936; *Speed on Wheels*, 1949.

His son Donald Campbell (b. 1921) designed a turbo-jet hydroplane called Bluebird with which on July 23, 1955, he established a world speed record on water of 202.32 m.p.h. on Ullswater. On Nov. 16, 1955, he raised the record with the same boat to 216.2 m.p.h. on Lake Mead, Nevada, U.S.A., and on Oct. 19, 1956, achieved 225.63 m.p.h. with Bluebird on Coniston Water, Lancs.

Campbell, MRS. PATRICK (1865-1940). British actress. Beatrice Stella Tanner was born in London, Feb. 9, 1865,



Mrs. Patrick
Campbell,
British actress

to an English father and an Italian mother. She studied music and was a talented pianist, but in 1888 made her appearance on the professional stage at Liverpool. Her performance as *The Second Mrs. Tanqueray* (*q.v.*) at the St. James's Theatre, 1893, established her reputation as an actress of the front rank. She was without rival in the portrayal of highly strung, emotional women, and a long list of outstanding parts included Hedda Gabler, Lady Macbeth, Magda, Elektra, Mélisande (in Eng-

lish and French). In 1914 she created the part of Eliza Doolittle in Shaw's *Pygmalion*; and appeared in *The Thirteenth Chair*, 1920; *Madame Sand*, 1920; *The Matriarch*, 1929. In 1884 she married Patrick Campbell (who was killed during the S. African War, 1900), and in 1914 George Cornwallis-West. Her reminiscences, *My Life and Some Letters*, 1922, included her correspondence with Bernard Shaw. She died in the U.S.A., April 9, 1940.

Campbell, REGINALD JOHN (b. 1867). British divine. Born in London, of Ulster Nonconformist parents, he was educated at University College, Nottingham, and Christ Church, Oxford. He became a Congregational minister in 1895, and succeeded Dr. Parker at the City Temple, London, in 1903. Four years later he published *The New Theology*, which he later repudiated. In 1916 he was received into the Church of England. Vicar of Christ Church, Westminster, 1917-21, and of Holy Trinity Brighton, 1924, he became canon residentiary of Chichester, 1930, and was chancellor of the cathedral, 1936-46. His books include *The Call of Christ*, 1933; *The Peace of God*, 1936; *Lives of Thomas Arnold and David Livingstone*.



R. J. Campbell,
British divine
Russell

Campbell, SIR RONALD HUGH (b. 1883). British diplomatist. Born Sept. 27, 1883, he entered the foreign office, 1907, and was private secretary to Lords Carnock, Hardinge, and Curzon, 1913-20; minister to France, 1929-35; to Yugoslavia, 1935-39; ambassador to France, 1939-40; and to Portugal, 1940-45.

Campbell, SIR RONALD IAN (b. 1890). British diplomatist. Born June 7, 1890, he was educated at Eton and Magdalen College, Oxford. He entered the diplomatic service, 1914, and his posts included those of 2nd and 1st secy., Paris, 1920-23; acting counsellor, Washington, 1927-31; minister plenipotentiary, Paris, 1938-39; minister at Belgrade, 1939-41, and at Washington, 1941-

45; deputy to the foreign secy. on the council of foreign ministers, 1945-46; ambassador to Egypt, 1946-50, when he retired.

Campbell, THOMAS (1777-1844). British poet. Born in Glasgow, July 27, 1777, the youngest son of a Virginia merchant, he went to Glasgow grammar school and university. He lived in Edinburgh 1797-1800, and in 1799 published *The Pleasures of Hope*, which won immediate popular favour. In the following summer he visited various German cities, and settled at Altona for the winter. On the alarm of war in the spring of 1801 he returned to England and contributed to the *Morning Chronicle* *Ye Mariners of England* and several other poems. At this time he wrote *Lochiel* and *Hohenlinden*. After 1803 he settled in London, and in 1805 he received a pension of £200.

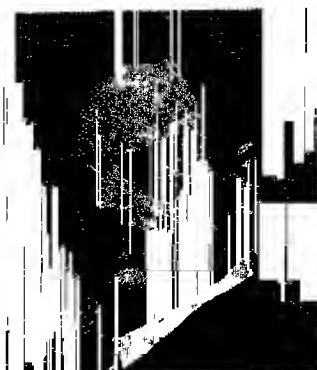
In 1809 Campbell published his charming narrative poem *Gertrude of Wyoming*, with some of the most popular of his shorter poems, including *The Battle of the Baltic* and *Lord Ullin's Daughter*. In 1834-35 he visited Algiers, and described his experiences in *Letters from the South*, 1837, and in 1842 published *The Pilgrim of Glencoe and Other Poems*. Removing to Boulogne in 1843, he died there June 15, 1844. He was buried in Westminster Abbey.

Campbell's poetry is very unequal, but he wrote in *Pleasures of Hope* lines that have become household words; and *Ye Mariners of England* and *The Battle of the Baltic* are popular examples of national songs. His prose writings, including a *Life of Mrs. Siddons*, have not survived. *Consult* *Life and Letters*, W. Beattie, 1849; *Complete Poetical Works*, ed. J. L. Robertson, 1907.

Campbell, WILLIAM WILFRED (1861-1918). Canadian poet. Born at Berlin, now Kitchener, Ontario, June 1, 1861, the son of a clergyman, he was educated at Toronto high school and at Cambridge, Mass. In 1885 he was ordained, but after working in New England and as



Thomas Campbell,
British poet
After Maclise



W. W. Campbell,
Canadian poet
Elliott & Fry

rector at St. Stephen, Brunswick, he entered the civil service, 1891, and was made bibliographer of the Dominion Archives of Ottawa. His first published volume of verse, *Lake Lyrics*, appeared in 1889: this was followed by *Collected Verse*, 1906, *Poetical Tragedies*, 1908, and *War Lyrics*, 1915. He wrote the novels, *Ian of the Orcades*, 1906, and *A Beautiful Rebel*, 1909. He died Jan. 1, 1918.

Campbell-Bannerman, SIR HENRY (1836-1908). British statesman. Born in Glasgow Sept. 7,



Sir Henry Campbell-Bannerman, British statesman

1836, he was a son of James Campbell, wholesale draper. His mother belonged to the Bannerman family, engaged in a similar business in Manchester, and on the death of his uncle Henry Bannerman in 1872 he took the name by which he is known. His father was lord provost of Glasgow in 1840-43, and his only brother, James Alexander Campbell (1825-1908), was Conservative M.P. for the universities of Glasgow and Aberdeen from 1880 to 1906.

Henry was educated at Glasgow high school and university, and at Trinity College, Cambridge. For a short time in business, he soon turned to politics, and was returned as Liberal M.P. for Stirling Burghs in 1868, retaining this seat until his death. During 1871-74, and again in 1880, he was financial secretary to the War Office. In 1882 he became secretary to the Admiralty, and during 1884-85 was chief secretary to the lord-lieutenant of Ireland. In the short Liberal ministry of 1886 he was secretary for war, and then another six years in opposition followed. In 1892 he returned to the War Office as secretary, and brought about the abolition of the office of commander-in-chief and the retirement of the duke of Cambridge. The Liberal government to which he belonged fell in 1895 as the result of a vote of censure passed on him for allowing the stock of cordite to run low.

Knighted in 1895, Sir Henry was chosen to succeed Sir William Harcourt as leader of the Liberal party in 1899, when the party was rent by internal divisions. At first he supported the South African War, though he did not hesitate to attack the diplomacy

that preceded it, and to urge the offer of peace terms at the earliest opportunity. In its later phases his condemnation of the "methods of barbarism" employed provoked hostility from a section of his party. After the war he opposed the education proposals of Balfour and the tariff policy of Chamberlain.

His reward came in 1905, when Balfour resigned, and King Edward sent for him to form a ministry. At the general election of Jan., 1906, the Liberals were returned with a large majority and C.-B., then confirmed as prime minister, at once insisted on the grant of self-government to the Transvaal and Orange Free State. A reduction in naval and military expenditure and a new education measure followed, and C.-B. also led the party against the house of lords preliminary to the curtailment of its powers. In spite of failing health he remained at his post until 1908; then on April 4 he resigned and on April 22 died in Downing Street.

Campbell-Bannerman was neither a great statesman nor a great orator, yet he succeeded where abler men might have failed, because of his unvarying good humour and his sturdy common-sense; while by tact, geniality, and some real wit he won respect and popularity. *Consult* Life, J. A. Spender, 1923; Letters, ed. Lord Pentland, 1925.

Campbellton. Town of New Brunswick, Canada. In the extreme N. of Restigouche co., at the head of navigation of the Restigouche river, it is served by C.N.R. It is the centre of a lumber and mixed farming district and famous for salmon and trout fishing and big game hunting. Pop. (1951) 7,754.

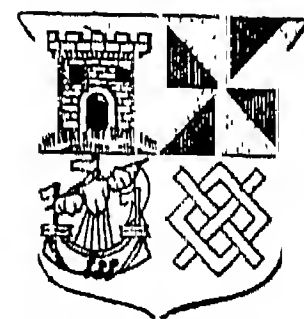
Campbelltown. A town of N.S.W., Australia, 31 m. S.W. of Sydney. Named in 1820 by Governor Macquarie after his 2nd wife, it is a centre for the dairy produce, fruit, and poultry of the area. Pop. (1954) 9,695.

Campbeltown. One of the 50 over-age destroyers transferred to the Royal Navy by the U.S.A. in return for Atlantic bases (*q.v.*). Built 1919 as the *Buchanan*, she displaced 1,090 tons on a length of 309 ft. and a beam of 30 ft. Her engines developed 24,200 s.h.p.

to give a speed of 35 knots. Her original armament of four 4-in. guns and 12 21-in. torpedo tubes was reduced when she was taken over by the R.N.

H.M.S. *Campbeltown* was the blockship at the raid on St. Nazaire (*q.v.*) on March 28, 1942, and carried the storming party of commando troops. She had her bows filled with concrete and was laden with explosives. Under Lt.-Comdr. S. H. Beattie, she rammed the lock gates, was scuttled there, and blew up later. Her commander, taken prisoner during the raid, won the V.C.

Campbeltown. Royal burgh and seaport of Argyllshire, Scotland, 83 m. by boat S.W. of Glasgow, with which there is also regular air connexion. It is an important fishing centre. There are whisky distilleries, a clothing factory, a creamery, and net-making works, and near by is a colliery. In the main street is a Celtic cross, c. 1375. The town was called



Campbeltown arms



Campbeltown, Argyllshire. View of the loch and harbour of this Scottish fishing centre

after the Campbells of Argyll. Pop. (1951) 7,169.

Campden Hill. London thoroughfare. A winding lane, known now as Campden Hill Road, it leads from Church Street, Kensington, to Holland Walk. In it stood Campden House, built in 1612 by Baptist Hicks, Viscount Campden. Later occupiers were Princess (later Queen) Anne, Lord Burlington, and Lord Lechmere. It was pulled down early in the 20th century. There was formerly a big observatory on Campden Hill, the last to use it being Sir G. B. Airy (*q.v.*). G. K. Chesterton was born on the hill in 1874. *See* Kensington.

Campe, JOACHIM HEINRICH (1746-1818). German lexicographer and writer of books for the young, one of which, based on Defoe's *Robinson Crusoe*, was very popular. Born at Deensen

in Brunswick, June 29, 1746, and educated at Halle, in 1787 he became minister of education in Brunswick, where he reorganized the school system, and bought an educational publishing business. He died Oct. 22, 1818.

Campeche OR CAMPEACHY. State of S. Mexico. It forms the W. part of Yucatan peninsula, is bounded W. by Bay of Campeche, and has an area of 19,670 sq. m. Composed largely of sandy plains with low hills, it produces cabinet timber, logwood (Span. *campeche*, from which it is named), cotton, rice, sugar, tobacco, wax, hides and cattle. Pop. (1950) 122,098.

Campeche OR CAMPEACHY. Fortified city and harbour of Mexico. The capital of the state of Campeche, it is on the Bay of Campeche, 90 m. by rly. S.W. of Merida. Formerly an important place, it has an old citadel, a cathedral, and a university. Its trade has declined, but it still exports chicle, sisal, and Panama hats. Its harbour is insecure, and cannot accommodate vessels of large draught. Shipbuilding is carried on. Founded in 1540, it was taken by the British in 1659. It was plundered by buccaneers in 1678 and 1685. Pop. (est.) 24,000.

The Bay of Campeche is the S.W. part of the Gulf of Mexico, between Yucatan and Vera Cruz.

Campeggio, LORENZO (1464-1539). Italian cardinal and diplomat. Born at Bologna, he studied civil law at Padua and Bologna. In 1509 he took orders and in 1512 was made bishop of Feltre by Pope Julius II. In 1518, being then a car-



Lorenzo Campeggio,
Italian cardinal

dinal, he was sent to England to enlist Henry VIII in a general league against the Turks. He failed in this, but with Wolsey he arranged an alliance between England and France. Henry VIII made him bishop of Salisbury.

At Rome, 1519-24, Campeggio urged the reform of church discipline. In 1524, made archbishop of Bologna, he was sent as cardinal legate to Germany. In 1528 he came to England at Wolsey's request to try the divorce suit of Henry VIII. His orders from Rome were to arrange a reconciliation, if possible, between Henry and Catherine, and to avoid any definite decision, and finally, on July 23, 1529, realizing that

Henry was not to be moved, he adjourned the court and returned to Rome. He took part in the diet of Augsburg in 1530, and died at Rome, July 25, 1539.

Camperdown. Town of Victoria, Australia, in Hampden co., 123 m. W.S.W. of Melbourne. It makes butter, cheese, and clothing, and has sawmills. Near by is the 90-sq. m. salt lake Corangamite. The neighbouring district is devoted to arable and dairy farming and the raising of sheep and cattle. Pop. (1954) 3,207.

Camperdown, BATTLE OF. Naval engagement Oct. 11, 1797, between the English and the Dutch.

Duncan blockaded the Dutch at the Texel with only the Venerable, Adamant, and three small vessels, while 95 enemy ships lay inside the port. This blockade was a triumph of audacity and courage. By confusing signals and changing flags he made the Dutch admiral, De Winter, believe that a great fleet was in the distance. In Sept. the Dutch gave up the idea of embarking troops, and Duncan was driven home by storms to Yarmouth to refit.

On Oct. 7 De Winter's fleet came out and stood along the Dutch coast towards the Maas. Duncan hastened to sea with 16 ships of the line, and went over to the Texel to get in the line of the Dutchmen's possible retreat. The enemy were sighted on the morning of Oct. 11 and the signal was hoisted that the fleet should head towards them in a line of bearing, each ship engaging an enemy in the old-fashioned way. The signals were obscured and not well understood, and subsequent signals did not bring the fleet into formal order. The Dutch were drifting slowly towards the shallows and the wind was driving straight on shore in dark and rainy weather. There was no time to be lost. With fine tactical insight, at about a quarter to twelve in the day, Duncan signalled the whole fleet to close the Dutch line, pass through its gaps, and engage to leeward, i.e. to pass through between the Dutchmen and the shore. It was a bold step, for the coast was not far distant, and a stubborn fight was certain.

Vice-admiral Onslow attacked the Dutch rear. Duncan himself passed through the line, firing both broadsides, in the thick of the battle and fighting against odds. The Venerable, Duncan's flagship, was hulled by 45 shot between wind and water, and became

almost unmanageable. For an hour the situation was extremely critical, but Onslow, who had by this time smashed the Dutch rear, came to Duncan's aid in the centre, where the Dutch ships were beaten to surrender, and the victory was decisive. It destroyed the Dutch navy. Nine of the enemy ships struck, others fled, and most of those which escaped were severely damaged. An end was put to all hope of invading England. Duncan's services in suppressing mutiny were almost as great as those he rendered at Camperdown, and he was able to procure the release of 180 mutineers by presenting their petition in person.

Camphausen, OTTO VON (1812-96). Prussian statesman. Joining the Prussian ministry of finance, in 1849 he was elected to the diet of Prussia and in 1869 became finance minister for Prussia. It fell to his lot to deal with the indemnity received from France. An advocate of free trade principles, he came into collision with Bismarck on this and kindred matters, and in 1878 resigned office. He died in Berlin, May 18, 1896.

Camphene. Crystalline hydrocarbon with the formula $C_{10}H_{16}$, fairly widely distributed in nature and obtainable from the oil of Siberian pine. Camphene may be made artificially by removing hydrogen chloride from bornyl chloride, or from isobornyl chloride, by the dehydration of borneol and isoborneol, and by the action of acetic anhydride on bornylamine. Camphene yields a number of products on oxidation, including camphor.

Camphor (*Cinnamomum camphora*). An evergreen tree of the family Lauraceae. A native of China, Japan, Formosa, and Cochin China, it has alternate, ribbed, lance-shaped leaves, and small greenish-white, more or less unisexual flowers without petals. The fruit is a small plum-like berry. It was formerly distinguished under the name of *Camphora officinarum*. The wood is used for making mothproof cabinets; and crude camphor is obtained by boiling pieces of the roots and branches and distilling the product.

Camphor (Arabic *kafur*). White, crystalline substance prepared from the camphor laurel, *Cinnamomum camphora*. All parts of the tree contain a volatile oil, one of the constituents of which is camphor, but it is from its wood that camphor is almost exclusively made. The tree is felled and the

wood, reduced to chips, is heated with water in a still, the camphor being volatilised with the water-vapour, and carried over to an earthenware vessel, where it deposits as a white mass.

The product obtained by the distillation process is known as crude camphor and is occasionally exported in this condition, but usually it is sent to the refineries for treatment before being placed on the export market. At the refineries the crude camphor is placed in vats with lime, charcoal, or sand, the vats are heated, and the camphor is collected by sublimation on the lid of the vat, which has projecting ridges, giving to the refined camphor the size of the blocks in which it is sold.

Originally used only as a medicine, camphor is less used in this way than formerly. Taken in small doses by mouth it is carminative. It also produces expectoration by reflex irritation of the stomach and is commonly used with opium in the treatment of coughs. Applied externally as a liniment, it dilates the blood vessels of the skin, causing at first a sensation of warmth, subsequently mild analgesia. Poisoning usually occurs in young children through the accidental swallowing of camphorated oil which consists of camphor dissolved in olive oil. The symptoms are nausea, vomiting and colic, delirium and convulsions. Most cases recover.

Camphor is a valuable industrial material and is much used in the manufacture of plastics and smokeless powders. It is made synthetically on a considerable scale from the pinene of turpentine oil.

Campidano. District of Sardinia. In the S.W. part of the isle, it is a fertile plain with an average width of 10 m. and stretches diagonally N.W. and S.E. between the gulfs of Oristano and Cagliari. Noted for wine, fruit, and cereals it was the justification for Sardinia's claim to be the granary of ancient Rome. Its yield in modern times has diminished.

Campin, ROBERT (1375-1444). Flemish painter. He lived at Tournai, and it is not known where he learnt his art. Despite his dissolute life and his banishment from Tournai for a year, he was employed by the municipal authorities on mural and decorative paintings. In 1428 he executed a painting in oil colours and gold with the figures of S. Piat, S. Eleutherius, and the French king, queen, and dauphin. He was the master of Roger van der Weyden

(*q.v.*), many of whose supposed works, including the celebrated Virgin and Child in a Room, in the National Gallery, London, are generally attributed to Campin. The Marriage of the Blessed Virgin, in the Prado museum, Madrid, was also probably painted by him. He died April 26, 1444.

Campinas. City of Brazil, 65 m. N.W. of São Paulo city. It is an important rly. junction, and is the centre of a rich coffee and sugar growing district. It has cotton, machinery, and soap factories, iron foundries, and tanneries. Pop. (1950) 101,746.

Campine (Flemish Kempen). Sandy area of Belgium. Covering parts of the provs. of Antwerp and Limbourg, it was formerly of much greater extent, a large part having been put under cultivation.

Camping. Living out of doors in tents or caravans. Under British law persons who camp for a lengthy period must observe the provisions relating to movable dwellings contained in any local act or bye-laws or in the Public Health Act, 1936, in districts where that act applies. A movable dwelling is any tent, van, or other conveyance whether on wheels or not, and any shed or similar structure used for human habitation. Subject to certain exceptions every person who keeps a tent or caravan or other movable dwelling on a site for more than 42 consecutive days or for more than 60 days in any 12 months must, unless the site is itself licensed, obtain a licence from the local authority; and every occupier of land who allows the land to be used in that way for more than these periods must obtain a licence for the site unless each person so using the land has himself obtained a licence. The minister of Housing and Local Government may exempt any camping organization from these requirements. Local authorities may acquire and equip sites as holiday camps or camping sites under the Physical Training and Recreation Act, 1937, and similar powers are given to a local planning authority in areas which contain a national park under the National Parks and Access to the Countryside Act, 1949. Under the Camps Act, 1939, a non-profit-making company, the National Camps Corporation, was established, which set up permanent camps designed to hold parties of schoolchildren; most of these camps were let to local authorities.

It is a trespass (*q.v.*) to camp on private land without permis-

sion. Trespass is not, in general, a criminal offence, but it is a criminal offence to camp on a common.

Campion. Common name for several plants belonging to genera of the family Caryophyllaceae. Bladder campion, *Silene cucubalus*, is a perennial plant in which the white flowers have a bladder-like calyx. Sea campion, *S. maritima*, a white-flowered perennial, occurs on maritime shingle and cliffs. Moss campion, *S. acaulis*, is a small plant which forms bright green moss-like cushions with deep rose or whitish flowers on mountain ledges or screes. Red campion, *Melandrium rubra*, and white campion, *M. alba*, have unisexual flowers. Rose campion, *Lychnis coronaria*, a plant of S. Europe, is sometimes found in the U.K. as a garden escape.

Campion, EDMUND (1540-81). English Jesuit. Born in London, Jan. 25, 1540, and educated at



Edmund Campion,
English Jesuit

Christ's Hospital and S. John's College, Oxford, he received deacon's orders in the Church of England. On leaving Oxford he proceeded to Ireland, returning to the Roman allegiance, thence to Douai, where he entered the Society of Jesus. After teaching at Prague, Campion was sent to England in 1580 to minister to Roman Catholics, at that time forbidden to practise their religion in England. Campion escaped arrest for 12 months, but he was captured while preaching at Lyford, Berks, July, 1581, charged with conspiracy against the crown, imprisoned in the Tower, racked, and executed, Dec. 1, at Tyburn. His personal character and bearing won him many sympathisers. He was beatified as a martyr by Pope Leo XIII in 1886. *Consult* Life, Evelyn Waugh, 1935.

Campion, THOMAS (c. 1567-1620). English physician, poet, musician, and masque writer. Born in London, educated at Cambridge, and at one time a member of Gray's Inn, he afterwards practised as a physician. He was held in high esteem as an authority on music by his contemporaries. The words and music of his English airs are full of charm, and the lines beginning Rose-cheeked Laura, Come, make up one of the few perfectly successful rhymeless lyrics in the language. Campion's plea for

unrhymed classical metres in his *Observations in the Art of English Poesy*, 1602, provoked Samuel Daniel's *Defence of Ryme*, 1603. Campion, who died in London, was buried at S. Dunstan-in-the-West.

Campi Raudii (Lat., Raudian Fields). Plain in N. Italy, near Vercelli, Piedmont, scene of the great victory, 101 B.C., of Marius and Catulus over the Cimbri and other barbarian invaders of Italy.

Camp Meeting. Name given to open-air religious gatherings, such as the revivalist assemblies, lasting several days, of the Methodist churches in the U.S.A. The first of these seems to have been held in Kentucky in 1799. They were introduced into England early in the 19th century, when, refused sanction by the Wesleyan conference, their adherents formed the denomination known as Primitive Methodists. In the U.S.A. camp meetings have assumed a secular and educational character.

Campobasso. Southernmost prov. of the region of Abruzzi e Molise, Italy. It slopes from an elevation of over 6,000 ft. N.E. to the Adriatic. In the uplands cattle-rearing is the chief industry; elsewhere cereals, the vine, olives, and hemp are grown. Area 1,700 sq. m. Its capital, also Campobasso, lies at a height of 2,131 ft. Cutlery is its best known industry. Pop. (1951) city, 27,981; prov., 391,284.

Campobello. An island of New Brunswick, Canada. It lies in the Bay of Fundy, at the entrance to Passamaquoddy Bay. Some 9 m. long, it is well wooded. Among its many summer visitors was the U.S. president F. D. Roosevelt who had a family home here.

Campo Formio, TREATY OF. Signed between the French Republic, represented by Bonaparte, and the Austrians, October 17, 1797, at Campo Formio, a village in Italy, a few miles from Udine. Austria gave up the Austrian Netherlands to France and Milan and Modena to the new Cisalpine republic; Venice was divided; Austria received Dalmatia, Istria, and other lands, France the Ionian islands. Secret articles provided that Austria should if possible obtain for France that part of Germany on the left bank of the Rhine, securing in return Salzburg and a small part of Bavaria.

Campoli, ALFREDO (b. 1906). Italian violinist. He was born in Rome, Oct. 20, 1906, and received his early training from his father, who was professor of the violin at the Accademia di Santa Cecilia in Rome. In 1911 he came to London

and began giving recitals at the age of 10. In 1919 he won a gold medal for his playing of the Mendelssohn concerto at the London Musical Festival. About 1930 he formed a small orchestra of his own which became famous for its polished performances of light music. After the Second Great War he returned to classical music, and became one of the most sought after soloists in the U.K. with all the great concertos in his repertoire.

Campos. Name given to the tropical grasslands which form the natural vegetation of large areas of the comparatively dry southern Brazilian highlands. The undulating relief and the broad expanses of tall grasses, interrupted by clumps of trees, which reach the dimensions of woods in hollows or other places where water collects, make the campos park-like.

Campos. City of Brazil, in the state of Rio de Janeiro. On the Parahyba river, 37 m. S.W. of São João Barra, it is connected by rly. with Rio de Janeiro, the capital. It trades in sugar, coffee, timber, and fruit, and has sugar refineries, distilleries, and fruit-preserving factories. Pop. (1950) 63,384.

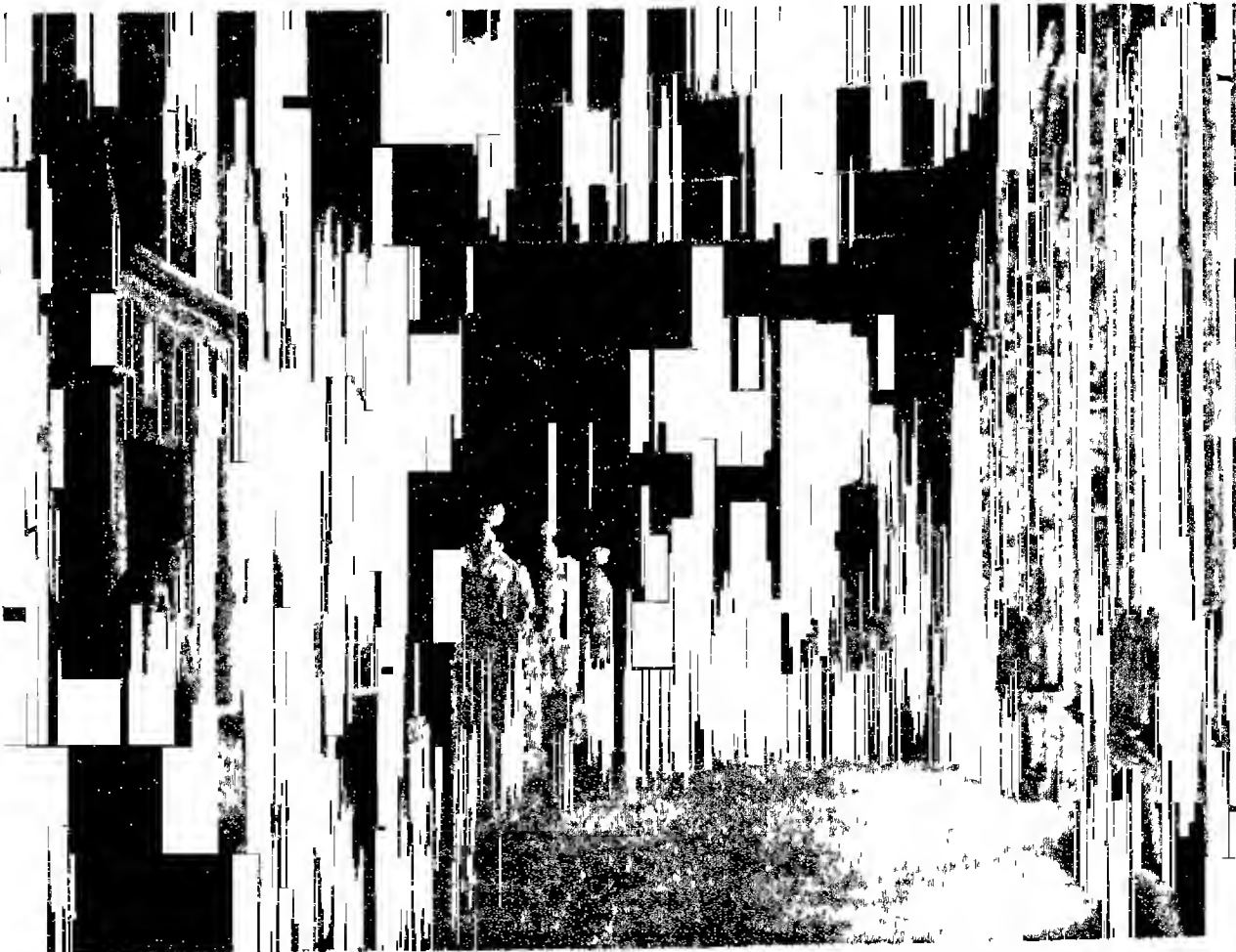
Camposanto (Ital., holy field). Name for a burial ground in Italy, sometimes remarkable for its cloisters, galleries, and other architectural features. The Camposanto of Pisa (seriously damaged in the Second Great War by fire following shell hits during 1944) is surrounded by a tall cloister of considerable width, built in the 13th century, though much of the Gothic tracery was added two centuries later. The burial ground

itself is said to have been filled up with earth from Palestine. The Camposanto at Genoa, about 2 m. E. of the town, dates from 1838.

Campulung. A town of Rumania in Suceava region. The ancient capital of Wallachia and a modern health resort, it has a 13th-century cathedral, monastery, and many churches. Near by are Roman remains. Pop. (est.) 10,000.

Campus Martius (Lat., Martian field). Low-lying land in ancient Rome between the Capitoline, Quirinal, and Pincian Hills and the Tiber, so called from an altar to Mars erected on it. Under the Republic it lay outside the city and was the place of assembly of the army and of the *comitia centuriata*.

Camrose, WILLIAM EWERT BERRY, 1ST VISCOUNT (1879-1954). British newspaper proprietor, who was also chairman of various large publishing organizations of many kinds. He was born at Merthyr Tydfil, June 23, 1879, the second son of John Mathias Berry, and started his journalistic career in 1893 on the Merthyr Times. He came to London in 1898, and was on the staff of several newspapers and periodicals before, in 1901, he founded *The Advertising World*, the first journal of its kind in Great Britain. At this time he took into partnership his younger brother Gomer Berry (later Viscount Kemsley, *q.v.*). Their initial effort in Fleet Street, based on a capital of £100, proved to be the beginning of a sequence of journalistic successes which eventually attained to dimensions exceeding any earlier achievements in the publishing world. In 1920,



Camposanto, Pisa. East gallery as it was before the sculptures and frescoes suffered severe damage from fire and weather following shelling in 1944

when Lord Northcliffe foretold the potential futures of these two young men from Wales—a future of expanding power and national service—they were already on the road to the great successes which their journalistic and organizing genius had marked out for them. William as editor-in-chief of The Sunday Times during 1915–1936 transformed that paper into an organ of national importance.

In 1920 the brothers were the principal owners of Cassell and Co., the publishers; the Financial Times; and Kelly's Directories, as well as Graphic Publications (Graphic, Bystander, and Daily Graphic). Later they bought the business of Iliffe and Sons, and made it a subsidiary of Kelly's Directories.

In 1924 they acquired from the Daily Mail Trust the provincial properties of E. Hulton and Co. at Manchester. Allied Newspapers Ltd., was formed to own these papers, and The Sunday Times was transferred to the new company, of which Sir William Berry became chairman, and his brother Gomer Berry vice-chairman. The 1st Lord Iliffe (*q.v.*) was also interested in the company, and thereafter in all the Berry enterprises. In the following years other provincial newspapers came under the Berry control, including daily and evening papers published in Glasgow, Aberdeen, Newcastle-upon-Tyne, Sheffield, Middlesbrough, and Cardiff.

In 1926 they added to their interests the great periodical publishing house called the Amalgamated Press (*q.v.*), then publishing more than one hundred widely circulated periodicals.

Two years later the partners made their most important venture. Sir William (he had been created a baronet in 1921), in company with his brother Sir Gomer (*cr. bt.* 1928) and Sir Edward Iliffe, acquired The Daily Telegraph from the Burnham family. As with all the other newspapers under their control, Sir William assumed the editorship-in-chief. In 1929 he was created Baron Camrose, of Long Cross.

In 1936 the partners decided to separate the control of the many newspapers and publishing enterprises which they had brought together. Lord Camrose elected to become the sole proprietor of The Daily Telegraph, and to retain the chairmanship of the Amalgamated Press and the Financial Times, and bought out his partners' interests in these concerns.



1st Viscount Camrose, British newspaper and periodical proprietor

He resigned the chairmanship of Allied Newspapers in favour of his brother (by now Lord Kemsley), and his similar position in Kelly's Directories in favour of Lord Iliffe, at the same time disposing to them of his share interests in the two concerns.

When Lord Camrose first took control of The Daily Telegraph its circulation was no more than 84,000. Sales began to increase at once, and rose steadily until by the time of his death the daily circulation was over one million—an unprecedented achievement for a newspaper which rigidly set its face against all suspicion of the sensational. Lord Camrose's book, *British Newspapers and Their Controllers*, 1947, provided a complete detailed record of the activities of the contemporary British press.

In 1939 Lord Camrose served for a time as adviser to the ministry of Information, and in 1941 was advanced to the rank of Viscount Camrose, of Hackwood Park. He died on June 15, 1954. He was succeeded in the title by his eldest son, the Hon. Seymour Berry (*b.* 1909), who also succeeded to the chairmanship of The Daily Telegraph; his second son, the Hon. Michael Berry (*q.v.*), became editor-in-chief of The Daily Telegraph as well as chairman of the Amalgamated Press.

John Seymour Berry, 2nd Viscount Camrose, was born July 12, 1909; was educated at Eton and at Christ Church, Oxford; sat as Conservative M.P. for the Hitchin division of Herts, 1941–45; and saw active service in the N. Africa and Italy campaigns of the Second Great War. Before his father's death he had been for some years deputy chairman of The Daily

Telegraph and a director of the Amalgamated Press.

Camulodunum (mod. Colchester). Ancient British town which first belonged to the Trinobantes but in A.D. 10 became the capital of the Belgic king Cunobellinus. It was destroyed by Claudius in A.D. 43 and about five years later a Roman veteran colony was founded close by the old British site. The colony, and its temple built for the worship of the emperor, the Divine Claudius, were destroyed by Boadicea (Boudicca) in A.D. 62. The town was afterwards rebuilt and parts of its walls (*c.* A.D. 100) remain. The vaults of the temple are preserved under the castle.

Camus, ALBERT (*b.* 1913). French novelist and dramatist. Born at Mondor, Algeria, Nov. 7, 1913, he studied philosophy, and during 1935–38 directed a theatrical company which gave classical and serious contemporary plays. In 1938 he became a journalist at Algiers, then in Paris, and during the German occupation helped to found the paper *Combat*, an organ of resistance. With J. P. Sartre (*q.v.*) he was one of the most widely read Existentialist writers. His novels include *L'Envers et l'Endroit*, 1937; *Noces*, 1938; *L'Étranger*, 1941; *La Peste*, 1947. His plays include *Le Malentendu* and *Caligula*, both 1944.

Camwood OR BARWOOD. Wood of a tree, *Baphia nitida*, family Leguminosae, native to West Africa. Hard, heavy, and dark red in colour, it was used formerly as a dye wood. Tool and knife handles are made from it. Owing to its scarcity, the wood of another leguminous tree from the same region, African Padauk, *Pterocarpus soyauxii* (sometimes incorrectly called camwood) is often used instead of camwood.

Cana OF GALILEE. Village of Palestine, the scene of Christ's first miracle (John 2), and generally known as Cana of Galilee. The site is uncertain; near Capernaum, W. of the Sea of Galilee, two villages, Kefr Kenna and Kana el Jelil, claim to represent the ancient one, while Conder argues in favour of Ain Kana, a spring near Nazareth.

Canaan. Hebrew name for Palestine. It originally denoted only the coastal region and the Jordan valley (Num. 13, *v.* 29).

Canaanites. Name applied to the descendants of Canaan grandson of Noah (Gen. 9), and to the early idolatrous inhabitants of the land between the Jordan valley and the Mediterranean (Gen. 12, *etc.*).

CANADA: BRITISH NORTH AMERICA

The physical features, climate, animal and vegetable life, social organization and history, agricultural and industrial resources of this largest country in the British Commonwealth of Nations are here described

The Dominion of Canada embraces the whole of the continent of North America north of the U.S.A., except the U.S. territory of Alaska. It is bounded on the W. by the Pacific Ocean and Alaska; on the S. by the United States at the 49th parallel from the Pacific Ocean to the Lake of the Woods, and thence by an irregular line to the Bay of Fundy; on the E. by the Atlantic Ocean, the Gulf of St. Lawrence, Davis Strait, and the dividing waters between Ellesmere Island and the Danish territory of Greenland; northward Canada extends to the North Pole. The Canada-United States boundary, undefended throughout its length, measures 3,986.8 m.; the Canada-Alaska border, 1,539.8 m.

Canada has an area of 3,845,774 sq. m. (exceeded only by that of the U.S.S.R.), with a population at the census of 1951 of 14,009,429. It is divided into ten provinces and two territories, Yukon and the North-West Territories.

PHYSICAL FEATURES. Apart from the Arctic Archipelago N. of Hudson Bay, a treeless region of vast extent, Canada falls into six natural divisions: the Appalachian and Acadian regions, the island of Newfoundland, St. Lawrence lowlands, the Canadian Shield, the interior plains, the Cordilleran region.

1. The Appalachian and Acadian regions include the maritime provinces of New Brunswick, Nova Scotia, and Prince Edward Island, together with the southeastern portion of Quebec. Save for the Notre Dame Mts. of the Gaspé Peninsula, the elevation is comparatively low. It is a beautiful country of diversified character with good orchard and farming lands, and along the irregular coast fishing and shipbuilding are the main industries. Here are the winter ports of Halifax and St. John. The area has mineral deposits in great variety, and produces half the coal, all of the asbestos, and about 95 p.c. of the gypsum mined in all Canada.

2. Newfoundland, larger than Ireland, has a deeply indented coast, mts. near the coast, poor soil, and a great expanse of fresh water—almost a third of its area. Fishing is the chief industry.

3. The St. Lawrence lowlands, the largest stretch of arable land in eastern Canada, comprise the



Arms of the Dominion of Canada

valley of the St. Lawrence river from Kingston to Quebec, and the peninsula of Ontario formed by the Great Lakes, an area of some 35,000 sq. m. Scene of the earliest settlements in the country, this flat and fertile plain, which runs inland for over 600 m. from the city of Quebec to Lake Huron, contains today the greater part of the population of Canada. It is not only an industrial area of great economic importance, but rich agriculturally owing to favourable climatic conditions and the fertile soil. The Niagara peninsula especially is famed for its fruit.

4. The Canadian Shield, a geological rather than a geographical division, is a formation of ancient hard crystalline rock overlain with shallow soil. It has an area of 1,850,000 sq. m. and comprises all the mainland of Canada to the east of the interior plains, excepting the Appalachian and St. Lawrence regions. It forms the core of Canada's mineral wealth, and from it come 85 p.c. of the gold, 39 p.c. of the silver, 87 p.c. of the copper, and all the nickel, platinum, and cobalt produced in the dominion. It also contains uranium deposits.

5. The interior plains form part of the great plains region of the North American continent which extends from the Gulf of Mexico to the Arctic Ocean. In Canada it is interrupted by the southern extension of the Canadian Shield into the U.S.A. in the region of Lakes Superior and Huron. This separates the larger western portion, the western plain covering Manitoba, Saskatchewan, and east-

ern Alberta, from the eastern in southern Ontario and Quebec. The western plain (the prairie proper) is the granary of the dominion, and contains also the vast petroleum, gas, and coal resources of western Canada.

6. The Cordilleran region forms part of the great belt which extends from the Andes to the Yukon, and includes some of the richest mining areas on the continent. This mountainous belt in Canada lies between the western plain and the Pacific Ocean, and is characterised by three great parallel ranges—the Rockies, the Columbia mountain system, and the Coast Range—interspersed by valleys, heavily timbered forests, and plateaux. The boundary line between the provinces of British Columbia and Alberta follows the watershed of the Rocky Mts. so that, with the exception of the eastern slopes of this range, the whole system lies within British Columbia. The highest peaks are Mt. Robson, 12,972 ft. (Rocky Mts.), Mt. Sir Sanford, 11,590 ft. (Columbia system), Mt. Waddington, 13,260 ft. (Coast Range). Highest peak in Canada is Mt. Logan (19,539 ft.) on the Yukon-Alaska boundary.

LAKES AND RIVERS. Almost seven p.c. of Canada's total area is represented by its lakes and rivers. The outstanding feature is the Great Lakes—Superior, Michigan, Huron, Erie, and Ontario. Through these lakes, by canal connexions from the St. Lawrence river, there is water transport from the Atlantic to the heart of the continent at Port Arthur and Fort William. The international boundary passes through all the lakes with the exception of Lake Michigan, which is wholly in U.S. territory. Lake Superior, 31,820 sq. m., is the largest body of fresh water in the world. Second to it is Lake Huron, 23,010 sq. m. Other large lakes are Great Bear Lake (11,200 sq. m.) and the Great Slave Lake (11,170 sq. m.) in the North-West Territories; Lake Winnipeg (9,400 sq. m.) in Manitoba; and Lake Athabaska (2,840 sq. m.) in Saskatchewan and Alberta. Of the rivers, the chief are the St. Lawrence (1,900 m.) which flows into the Atlantic; the Nelson (360 m.), the Saskatchewan (1,205 m.), and the Churchill (1,000 m.) which flow into Hudson Bay; the Yukon (1,924 m.) and

the Fraser (785 m.) which flow into the Pacific; and the Mackenzie (2,514 m.) which flows into the Arctic Ocean.

CLIMATE. The country is so vast, the range of latitude so extensive, and local conditions are so varied, that it is impossible to speak of the climate of Canada in other than general terms. The summers are warm and dry; the winters dry and cold, with brilliant sunshine and an exhilarating atmosphere; the springs short, and the autumns long and fine, especially the late autumn (or fall), known as the Indian summer. The most favoured climatic region is the S.W. coast of British Columbia which, tempered by the Japan Current, resembles that of southern England. Lowest recorded winter temperatures occur in Yukon.

FLORA AND FAUNA. Botanically, five zones may be distinguished in Canada. There is the Arctic zone, extending far to the south of the Arctic Circle, with its southern limit on the west coast of Hudson Bay. It is wholly treeless, the most conspicuous woody plants being dwarf willows and birches. The sub-Arctic zone, which succeeds it, is virtually identical with the northern limits of the white and red pine. Characteristic of it is the abundance of berry shrubs such as gooseberries, currants, blueberries, raspberries, yellowberries, and high-bush cranberries; it is unsettled except in parts of the clay belts of northern Quebec and Ontario.

Next below the sub-Arctic comes the hardwood forest zone, marked chiefly by deciduous trees such as basswood, maple, red maple, black ash, white ash, white elm, yellow birch, red oak, burr oak, and beech. Of the conifers, white pine, red pine, hemlock, and white cedar are the most important. This zone includes all eastern Canada with the exception of

a small region in southern Ontario, and is noted for the splendid autumnal colouring of the leaves of trees and shrubs.

There is another small zone which is confined to a tract of land in southern Ontario, and remarkable for the fact that a number of plants grow there which occur nowhere else in Canada. This Carolinian zone exhibits such varieties as the cucumber tree, the tulip tree, the flowering dogwood, the red mulberry, the American crab-apple, and many others, in addition to a rich herbaceous vegetation and such characteristic trees as the hickories (6 species), the oaks (10 species), black walnut, chestnut, and sycamore. The prairie, though sub-divided botanically into three zones, has a vegetation common to all three in the grasses, woodland plants, and the shrubs which grow in low thickets and copses. The mountain ranges in the west contain a number of sub-alpine forms, but the richest growths are in the valleys and lowlands. The vegetation in the Coast Range is almost sub-tropical, owing to the long growing season, high average temperature, and heavy rainfall, and the trees, especially the cedar, the Douglas fir, and the spruce, attain gigantic dimensions. The major part of Vancouver I. has a typical Coast Range flora.

The general distribution of wild life in Canada is on well-defined lines. In the Arctic the distinctive land mammals are the polar bear, musk ox, barren land caribou, arctic fox, arctic hare, and lemming; the birds are snow buntings, ptarmigan, longspurs, snowy owls, and jer-falcons. In the sub-Arctic zone are deer, wapiti, moose, and the woodland caribou. In the coniferous forest belt, creatures include moose, fox, beaver, otter, marten, marmot, lynx, wolverine, mink, porcupine,

fisher, muskrat, skunk, and ermine, five varieties of the Canada goose, grouse, prairie chicken, white-throated sparrow, olive-backed thrush, three-toed woodpecker, spruce grouse, and Canada jay. Typical of the mountains in the west are the black bear (a timid, inoffensive beast much reduced in numbers through the value of its fur) and the grizzly (now rare except in the national parks, where it is strictly preserved), the mountain goat, and the cougar.

AREA AND POPULATION. The table at the foot of the page shows the administrative divisions of Canada with the capital, area, and population of each. The population of Canada has been drawn from many sources. The two basic stocks are the French and British. In all the provinces, with the exception of Quebec and New Brunswick, the bulk of the population is of British origin.

A characteristic of population distribution since the peak immigration year of 1913, when 400,870 arrivals were recorded, has been the rapid growth, due to industrial development, of urban centres. In 1911, 54.6 p.c. of the population was classified as rural and 45.4 as urban. By 1941 these figures had been reversed, the census showing 45.7 p.c. of the population as rural and 54.3 p.c. as urban; by 1951 the proportions were 38 p.c. rural, 62 p.c. urban. In density of population among the provinces, Prince Edward I. led in 1951 with 45.07 to the sq. m., and British Columbia was the lowest with a population of only 3.24 per sq. m.

PEOPLES. In 1951, people of British descent formed 47.8 p.c. of the total population of 14,009,429. This proportion had fallen from 51.9 p.c. in 1931. The proportion of inhabitants of French extraction, by contrast, rose, through natural increase, from 28.2 p.c. in 1931 to 30.8 p.c. in 1951. The

CANADA: CAPITAL CITIES, AREAS, AND POPULATIONS OF ITS PROVINCES AND TERRITORIES

	<i>Capital</i>	<i>Land (sq. m.)</i>	<i>Water (sq. m.)</i>	<i>Total land and water (sq. m.)</i>	<i>Population (1951 census)</i>
Newfoundland	St. John's	147,994	7,370	155,364	301,416
Prince Edward Island	Charlottetown	2,184	—	2,184	98,429
Nova Scotia	Halifax	20,743	325	21,068	642,584
New Brunswick	Fredericton	27,473	512	27,985	515,697
Quebec	Quebec	523,860	71,000	594,860	4,055,681
Ontario	Toronto	348,141	64,441	412,582	4,597,542
Manitoba	Winnipeg	219,723	26,789	246,512	776,541
Saskatchewan	Regina	220,182	31,518	251,700	831,728
Alberta	Edmonton	248,800	6,485	255,285	939,501
British Columbia	Victoria	359,279	6,976	366,255	1,165,210
Yukon (territory)	White Horse	205,346	1,730	207,076	9,096
North-West Territories		1,253,438	51,465	1,304,903	16,004
Totals ..		3,577,163	268,611	3,845,774	14,009,429



1. "The Canadian," a special train run by the C.P.R. in the Rocky Mts. 2. On the Trans-Canada Highway, between Hearst and Geraldton, Ontario. 3. Canadian mounted policeman on patrol. 4. Highway bridge across

the St. Lawrence river at Montreal. 5. Dog-sledge used in the North-West Territories for light transport. 6. Winter sports at Mount Norquay, near Banff. 7. The prairie and Bow River near Calgary, Alberta

CANADA: VARIED ASPECTS OF LIFE AND LANDSCAPE IN THIS VAST LAND

Photos 1, 3, Canadian Pacific Railway; 2, 5, National Film Board, Canada; 7, Trans-Canada Airlines

German element accounted for 4.5 p.c. of the 1951 population, the Ukrainian for 2.8 p.c., the Dutch for 1.8 p.c. There were important minorities of Jews, Italians, and Russians. The Indians, although comprising only about 1 p.c. of the total population, rose from 118,316 in 1941 to 155,874 in 1951, the Eskimos from 7,205 to 9,733.

The minorities in Canada tend to concentrate in special areas and often to live in segregated communities. Thus the French element is found chiefly in Quebec, Ontario, and New Brunswick; while most Icelandic settlers are found on the border of Lake Winnipeg, the Russians on the forest edge of the prairies, the Japanese in British Columbia, the Negroes in the cities of Nova Scotia and Ontario, and the Chinese in towns everywhere. Despite this, the various ethnic elements are culturally well fused, and 99 p.c. of the population speak one or both of the two official languages, English and French.

CITIES AND TOWNS. The most striking feature of Canadian development during the first half of the 20th century was the growth of the cities in the east, and the rise of new ones in the west. Montreal, for example, which in 1942 celebrated its tercentenary, quadrupled in that period and with a population, including its suburbs, of 1,395,400 in 1951 was, with the exception of Paris, the city with the largest French-speaking population in the world.

Villages into Cities

Vancouver, which in 1886 had just been carved out of the virgin wilderness, was in 1951 a city of 344,833, and bid fair to become one of the world's leading ports. Other cities, such as Edmonton, Alta. (159,631), Regina, Sask. (71,319), Saskatoon, Sask. (53,268), Moose Jaw, Sask. (24,355), Sudbury, Ont. (42,410), Timmins, Ont. (27,743), and Shawinigan Falls, Que. (26,903), were simply villages in 1900. The founding of these cities, with many other prosperous towns and communities, was due to railway development following the encouragement given to immigration by the free land grants policy inaugurated at the beginning of the 20th century. After the Second Great War industrialisation led to the rapid expansion of western cities: the population of Edmonton, for example, increased by 70 p.c. during 1941-51.

Other principal cities of Canada are: Toronto, Ont. (675,754), Winnipeg, Man. (235,910), Hamilton, Ont. (208,231), Ottawa, Ont. (202,045), Quebec, Que. (164,016), Windsor, Ont. (120,049), Calgary, Alta. (129,060), London, Ont. (95,343), Halifax, N.S. (85,589), St. John's, Newfoundland (52,873), St. John, N.B. (50,779), and Victoria, B.C. (51,333). Ottawa is the capital city and seat of government.

COMMUNICATIONS. Nowhere have railways exercised a more potent influence on national growth and expansion than in Canada. Indeed, the development of the country may be said to date from the completion of the trans-continental system of the Canadian Pacific rly. in 1885. This great undertaking not only opened up the Canadian middle west; in piercing the barrier of the Rocky Mts. and linking the Atlantic with the Pacific, it gave a unity to the country. Until its completion, the chief systems operating in Canada were the Intercolonial rly. in the Maritime Provinces, and the Grand Trunk rly. in Ontario and Quebec. These, together with the later systems of the Canadian Northern rly. and the Grand Trunk Pacific, were merged in the govt.-owned Canadian National rlys. (*q.v.*).

Of the 58,760 m. in operation in 1955, the federal govt. operated over half. The principal private system is the Canadian Pacific rly. with 16,578 m.

In most cities, the electric street railways have been replaced by buses. There has been a decrease in the use of urban transit systems, owing to the increased number of private vehicles in use. In 1956, Toronto had Canada's only underground railway.

St. Lawrence Waterway

The St. Lawrence waterway, connecting the Great Lakes with the Atlantic, is the world's greatest inland navigation system. It enables ships to penetrate over 2,000 m. to the western end of Lake Superior. Widening and deepening projects are in view to enable large sea-going vessels to ply the Great Lakes. The other canal systems are not important.

Principal harbours of Canada are Halifax, St. John, Quebec, Three Rivers, and Montreal in the east; Churchill on Hudson Bay; Vancouver, Victoria, and Prince Rupert in the west.

In 1954, approx. one in four persons was registered in Canada as owning a motor vehicle, the

total registration being 3,644,589. The extent of motor traffic has made the construction of roads and scenic highways one of the chief items of expenditure by the provinces. The mileage in 1953 was 191,000 miles of surfaced roads, and more than 320,000 miles of earth roads.

Trans-Canada Highway enables motorists to traverse the dominion from the Atlantic to the Pacific. The N.W. Highway system (the Canadian sections of the Alaska Highway built as a war measure by the U.S.A. in 1942) extends for 1,250 miles from Fort St. John to the border of Alaska.

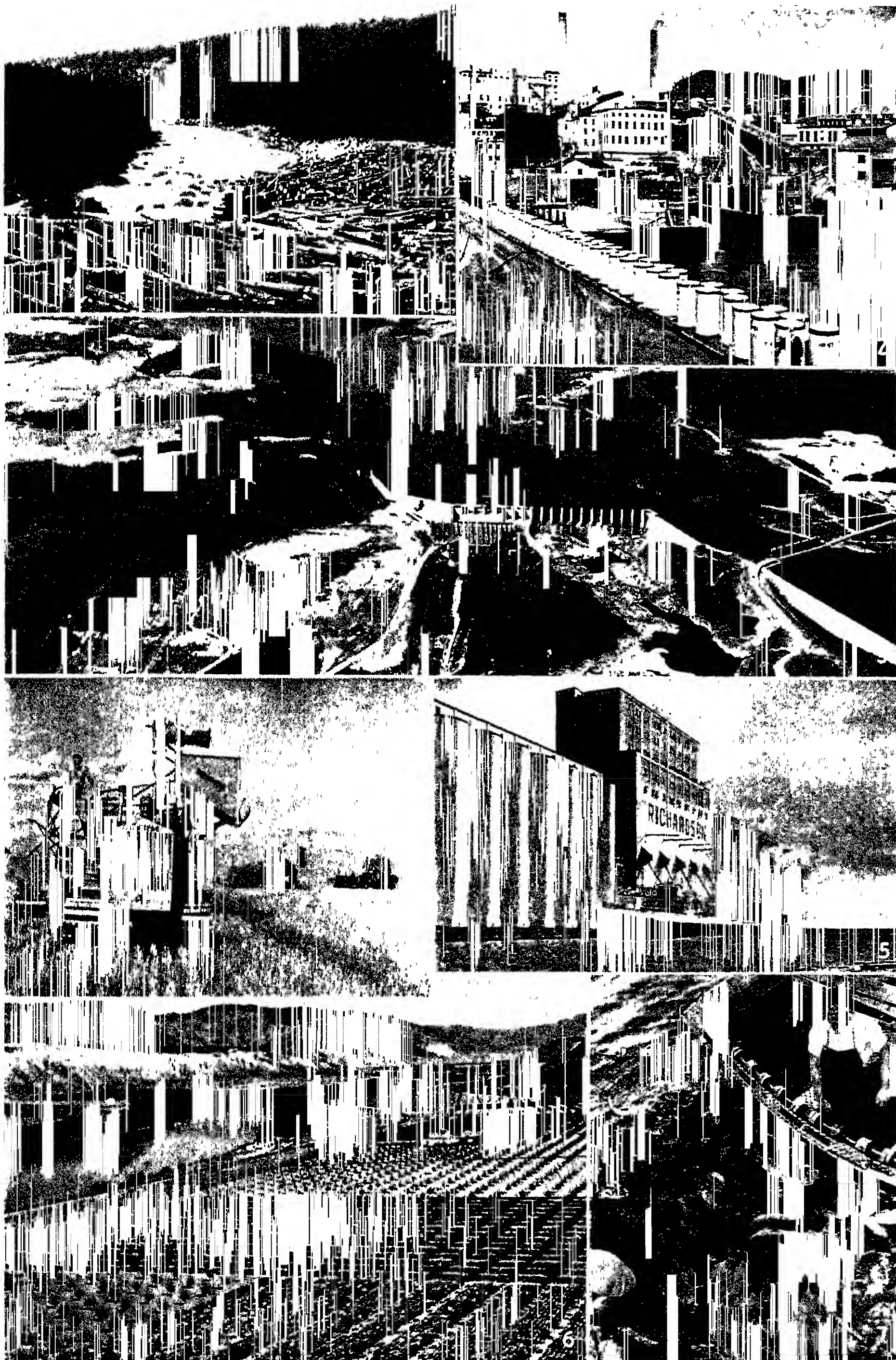
Civil aviation is of increasing importance in such a vast country both for inter-city communication and for transport of passengers and freight to otherwise inaccessible areas. Air services are grouped into two classes: non-scheduled and scheduled. Over 160 operators provide non-scheduled services which include not only transport but aerial photography and pest and fire control. The development of the North would have been impossible without these services.

Scheduled Air Routes

Scheduled services are provided by Trans-Canada Air Lines and Canadian Pacific Air Lines, assisted by four small independent lines. T.C.A., a govt.-owned corporation, connects most major Canadian cities from Newfoundland to British Columbia, as well as providing overseas connexions with 10 countries. C.P.A.'s domestic operations are chiefly in the north and the west; it also operates a number of overseas routes connecting Canada with Mexico, Peru, the Far East, and Europe.

Because of the great distances, the number of private aircraft in Canada is increasing. Most of the 1,203 which were registered in 1954 were owned by ranchers, farmers, oil men, and commercial firms. Helicopters are becoming the "new pack horses" of Canada. Canada has more than 400 landing areas and more than 2,500 civil aircraft.

The Canadian telegraph systems are composed of lines owned by the federal govt. and by chartered railway and telegraph companies. They are operated under great climatic and geographical difficulties. Sixteen trans-oceanic cables have termini in Canada—14 of them on the Atlantic coast and two on the Pacific. One govt.-owned and two private companies operate cable and



1. Log jam on the Montreal river. 2. Wood pulp and paper factory on the Powell river, B.C. 3. Shipshaw hydro-electric station on the Saguenay river; it has a capacity of 300,000 h.p. 4. Harvesting wheat

near Glamis, Saskatchewan. 5. Taking on a cargo of wheat from giant elevators at Port Arthur. 6. Apple farm in the South Thompson Valley, near Kamloops, B.C. 7. Netting salmon in British Columbia

CANADA: GLIMPSES OF THE DOMINION'S AGRICULTURAL AND INDUSTRIAL ACTIVITIES

Photos, 1, Canadian Pacific Railway; 2, 4, 5, 6, and 7, National Film Board, Canada; 3, Canadian Pacific Air Lines, Ltd

radio systems connecting Canada with the U.K., U.S.A., Bermuda, Australia, New Zealand, St. Pierre and Miquelon, and the Azores. Canada has some 3,000 separate telephone systems. More than 2,000 of these are cooperative telephone companies operating in Saskatchewan, Alberta, and Nova Scotia. There are three large provincial systems in Manitoba, Saskatchewan, and Alberta; three smaller ones in Ontario, Quebec, and New Brunswick; 22 municipally operated, of which the largest are in the cities of Edmonton, Fort William, and Port Arthur; and one large company, the Bell Telephone co., whose telephones in Quebec and Ontario constitute 58 p.c. of all those in Canada.

Broadcasting is controlled by the Canadian Broadcasting Corporation, a body similar to the B.B.C. Through three networks—Trans Canada, Dominion, and French—it regulates some 120 commercial stations as well as more than 50 of its own. The "Voice of Canada" broadcasts in 16 languages on the strongest signal received in Europe from North America. Television coverage is rapidly increasing; by 1954 there were 7 C.B.C. and 14 private stations.

AGRICULTURE. Although Canada is now among the leading manufacturing countries of the world, agriculture, which includes stock raising and horticulture, remains the most important single primary industry of the Canadian people. It is fostered by departments of agriculture in every province; it is supported by a farm loan board which gives financial assistance in improving land and stock; and it is tutored by a dominion-wide experimental farm service. It was by the cereals division of this service that the Huron, Marquis, and Prelude varieties of rust-resisting and early-ripening wheat were produced—varieties which have had the effect of extending the wheat belt hundreds of miles farther north.

Chief Cereal Crops

Wheat is the most important single crop. Saskatchewan and Alberta are the leading wheat provinces: of the 494,000,000 bushels produced in Canada in 1955 from 21,500,000 acres, they produced 298 million and 133 million. The chief field crops other than wheat are oats, barley, rye, hay, clover, peas, beans, beets, flaxseed, and potatoes which are grown in all the provinces.

Mixed animal and arable farming is general everywhere, and hogs, poultry, and sheep are reared in great numbers. Cattle raising is confined chiefly to Alberta and a part of British Columbia. Dairying is general, but the principal centres of cheese production are in Ontario and Quebec, which are also large producers of honey, maple syrup, and tobacco. Apples are exported in large quantities from British Columbia, in smaller quantities from Ontario and Nova Scotia. Canadian farming is highly mechanised.

BASIC RESOURCES. Canada is immensely rich in natural resources. Apart from agricultural land (estimated at 440,951,000 acres), the main sources of natural wealth are the forests, fisheries, mines, and water power. The products of the forests yield the largest amount of foreign exchange of any industrial group. The chief areas are the great fir forest of the Rocky Mts. and the Pacific coast; the northern coniferous forest stretching from north of the Great Lakes to Labrador; and the deciduous hardwood forest extending from Lake Huron through southern Ontario and Quebec to New Brunswick and the Atlantic coast. The total forested area is estimated at 1,320,321 sq. m., of which 60 p.c. is productive.

Fisheries of Canada

The fisheries were the first of Canada's resources to be exploited by Europeans, the cod-banks south of Newfoundland and east of Nova Scotia attracting fishermen long before the discovery of North America. These fishing grounds alone extend along a coastline of more than 5,000 m. Other fishing grounds are the inshore expanses of the St. Lawrence, the Great Lakes and other inland waters, Hudson Bay, and the 7,000-m. littoral of British Columbia, with its salmon fisheries, and the great halibut fishing grounds of the N. Pacific. Estimated value of production for 1951 was \$204,894,000, the highest on record. To this total British Columbia contributed approximately 50 p.c., Nova Scotia 23 p.c., New Brunswick 12 p.c.

Canada is one of the outstanding mineral-producing countries of the world. The greater part of the production comes from the Precambrian area or Canadian Shield, and the Cordilleran region of British Columbia. Crude petroleum, from the western prairies, leads all other minerals in value of

production: in 1954, \$244,000,000. Gold is decreasing in relative importance. The other chief minerals are copper, iron, lead, nickel, zinc, silver, the platinum group, uranium, asbestos, and coal.

Coal, found in Nova Scotia, New Brunswick, Alberta, and British Columbia, is mined in decreasing quantities. Expansion continues of iron-ore working in N.W. Ontario and Quebec-Labrador. The Sudbury, Ontario, area produces 48 p.c. of Canada's copper as well as all of the nickel which represents 90 p.c. of the world's production. Canada is the world's leading producer of the platinum group of metals, by-products of nickel refining. The asbestos mines of S. Quebec are the world's leading source of supply; common salt comes from S.W. Ontario and from the mine at Malagash, N.S., and gypsum from Hants, Inverness, and Victoria counties in Nova Scotia. The uranium deposits of N. Saskatchewan and the North-West Territories make Canada a leader in the use of atomic energy.

The fur trade, once the most rewarding industry in Canadian economy, has become of relatively minor importance. There are some 2,500 fur farms throughout the country, the majority in the prairie provinces, British Columbia, and Ontario, raising chiefly fox, chinchilla, and mink.

Development of hydro-electric power from Canada's widely distributed waterways has been the mainspring of industrial expansion and has brought to the greater part of the population the amenities of electric lighting and other services, public power commissions for the distribution of which are established in New Brunswick, Nova Scotia, Quebec, Ontario, Manitoba, Saskatchewan, and British Columbia.

Growth of Industry

MANUFACTURES. Nearly one-third of the national income comes from manufacturing, in which one out of every four working Canadians is employed. Industry is no longer wholly dependent on the processing of Canada's own natural resources. There has been a consistent growth in secondary manufacturing. The leading industries are: non-ferrous metal smelting and refining, pulp and paper-making, meat packing, motor car manufacture, flour and feed milling, butter and cheese making, saw-milling, the production of petroleum and its by-products, electrical equipment, railway rolling stock,

bread and other bakery goods, rubber articles (including footwear), primary iron and steel, cotton yarn and cloth, printing and publishing, chemicals, ship-building, and the manufacture of aircraft.

Each province has its own characteristic industries. In Prince Edward Island butter and cheese making, fish curing, and fish packing are predominant. Nova Scotia, renowned for its coalmines, works the high-grade iron-ore of Newfoundland, easily accessible by sea, and has petroleum refineries. The forests of New Brunswick add pulp and paper and sawmilling industries to this province's fish packing. Quebec makes textiles, clothing, boots and shoes, etc., for its own large population, while the making of pulp and paper from its forests and the smelting of non-ferrous metals from its mines make it the second largest manufacturing province of the dominion. The premier position is held by Ontario, whose manufacture of motor cars and agricultural implements is assisted by access to the iron ore of Minnesota and N.W. Ontario and the coal of Pennsylvania. In the prairie provinces, meat packing, butter and cheese making, flour and feed milling, processes connected with petroleum refining, are the chief industrial activities. In British Columbia, the third most important manufacturing province of the dominion, conversion of its immense timber resources at the sawmills and the pulp mills, and curing and packing based on its estuarine salmon fisheries, provide the leading items in a long and diverse list of industries.

RELIGION. There is no state church in Canada, but in the province of Quebec, the R.C. church enjoys certain rights under the Quebec Act passed by the British parliament in 1774. Chief religious denominations are: R.C. (43 p.c.); Anglican (14.7 p.c.); United Church of Canada, formed in 1925 by a union of the Congregational, Methodist, and Presbyterian churches in Canada (20.5 p.c.).

EDUCATION. Education in Canada is under the control of the provinces. Each has its own system of public elementary and secondary education, financed by local school authorities assisted by provincial grants. In all, there are some 33,000 schools maintained at an annual cost of \$454,139,000. Canada has very

few illiterates. All the provinces, except Prince Edward Island, have their own universities. Chief universities are: Alberta (Edmonton, Alta.); British Columbia (Vancouver, B.C.); Manitoba (Winnipeg, Man.); New Brunswick (Fredericton, N.B.); Dalhousie (Halifax, N.S.); Acadia (Wolfville, N.S.); Laval (Quebec, Que.) & McGill (Montreal, Que.); Université de Montreal (Montreal, Que.); Toronto (Toronto, Ont.); Queen's (Kingston, Ont.); McMaster (Hamilton, Ont.); Saskatchewan (Saskatoon, Sask.); Western Ontario (London, Ont.); Memorial (St. John's, Nfld). The Royal Military College is at Kingston, Ont.; and Osgoode Hall (Toronto) is a law school.

Public Libraries

Some 1,600 public libraries house 7,500,000 volumes. Every province has its museums and galleries. The National Gallery of Canada, at Ottawa, contains the national art collections; the National Museum of Canada in the same city exhibits collections illustrating the natural history of the dominion; Laval University, Quebec, houses the Legare collection of European art, and the Royal Ontario Museum at Toronto has a rich ethnological collection.

ART, LITERATURE, SCIENCE. The earliest stirrings of a purely Canadian art were marked in wood carving and in distinctively French-Canadian architecture of the St. Lawrence valley. Early painters, of whom the most important were Cornelius Krieghoff (1812-72) and Paul Kane (1810-71), recorded the country's beauty and routine life in Brueghel-like detail. Not until J. W. Morrice (1815-1924), M. Cullen (1866-1934), and M. A. de F. Suzor-Côté (1868-1937) explored Impressionism was a significantly new approach developed. Out of these explorations grew the Group of Seven—Lawren Norris, A. Y. Jackson, Arthur Lismer, Franklin Carmichael, Frank Johnston, J. E. H. MacDonald, F. H. Varley—who gave a new direction and purpose to Canadian art, based on the use of vivid colours in an impressionistic technique. These men and the brilliant Tom Thomson (1877-1917) gave Canadian art its distinctive character—the strongly coloured landscapes of the North. In the 1930s the Group dissolved. It left no successor—simply a number of individual styles. Public interest in art is growing and most large

cities have art galleries and schools of art.

National consciousness in Canadian literature developed slowly owing to sparseness of population and overwhelming American influences. Literature of a regional character resulted. The maritimes have been described by T. C. Haliburton (1797-1865), the first name in Canadian literature, "Lucy Montgomery", Chas. G. D. Roberts, Hugh MacLennan; Ontario by many, including Stephen Leacock, Mazo de la Roche, and Morley Callaghan; the prairie provinces by "Ralph Connor" and W. O. Mitchell; British Columbia by Frederick Niven and R. A. Hood; Quebec by Louis Hémon, Albert Longeau, Louis Frichette, Gabrielle Roy, and Roger Lemelin; Indian life by the Indian princess, Pauline Johnson (1860-1913). Pre-confederation poetry is dominated by Charles Heavyside (1816-76) and Charles Sangster (1822-93). After 1867, G. G. D. Roberts (1860-1943), Bliss Carman (1861-1929), Archibald Lampman (1861-99), and Duncan Campbell Scott (1862-1947) are the major figures. W. H. Drummond (1854-1907), Robert Service (b. 1874), and T. MacInnes wrote popular poetry with "man in the raw" as their theme. After the First Great War E. J. Pratt was the central figure, other poets of note are A. Klein, R. Finch, F. R. Scott, A. J. M. Smith, E. Birney, Dorothy Livesay, and W. Macdonald.

Scientific Research

Scientific research in Canada is coordinated through the National Research Council, established by the federal govt. in 1924 for the purpose of fostering and stimulating scientific and industrial research throughout the country, and since that date all the provinces and many large firms have set up their own research organizations. The council not only carries on its own activities through the National Research Laboratories, Ottawa, but supports researches in the laboratories of numerous other institutions across Canada. With the object of building up a body of scientifically trained workers, the council annually awards over 300 research grants and scholarships and has thus succeeded in making various Canadian universities, and especially the smaller institutions, active and permanent centres of research.

MUSIC AND DRAMA. A marked feature of cultural life throughout

Canada is the interest taken in music and the drama. There are innumerable choirs, many of a very high standard. More than 12 cities have symphony orchestras. Musical organizations ensure that the public, in larger cities, is offered a wide range of concerts. There are many annual music festivals and musical education is emphasised in the schools. Composers like Healey Willan, Colin McPhee, Pierre Mercure, Alexander Brott, and François Morel are internationally recognized. A lively public interest in ballet led to the establishment of professional companies. There is a college of organists at Toronto, and conservatoires at many of the universities. Dramatic societies, little theatres, drama leagues and associations are everywhere; their activities culminate in the Dominion Drama Festival. The Shakespearian Festival, inaugurated at Stratford, Ont., in 1954, attracts world-wide attention through the

some outstanding publicists in such men as Nicholas Flood Davin (1843-1901), John Ross Robertson (1841-1918), and J. W. Dafoe (1866-1944).

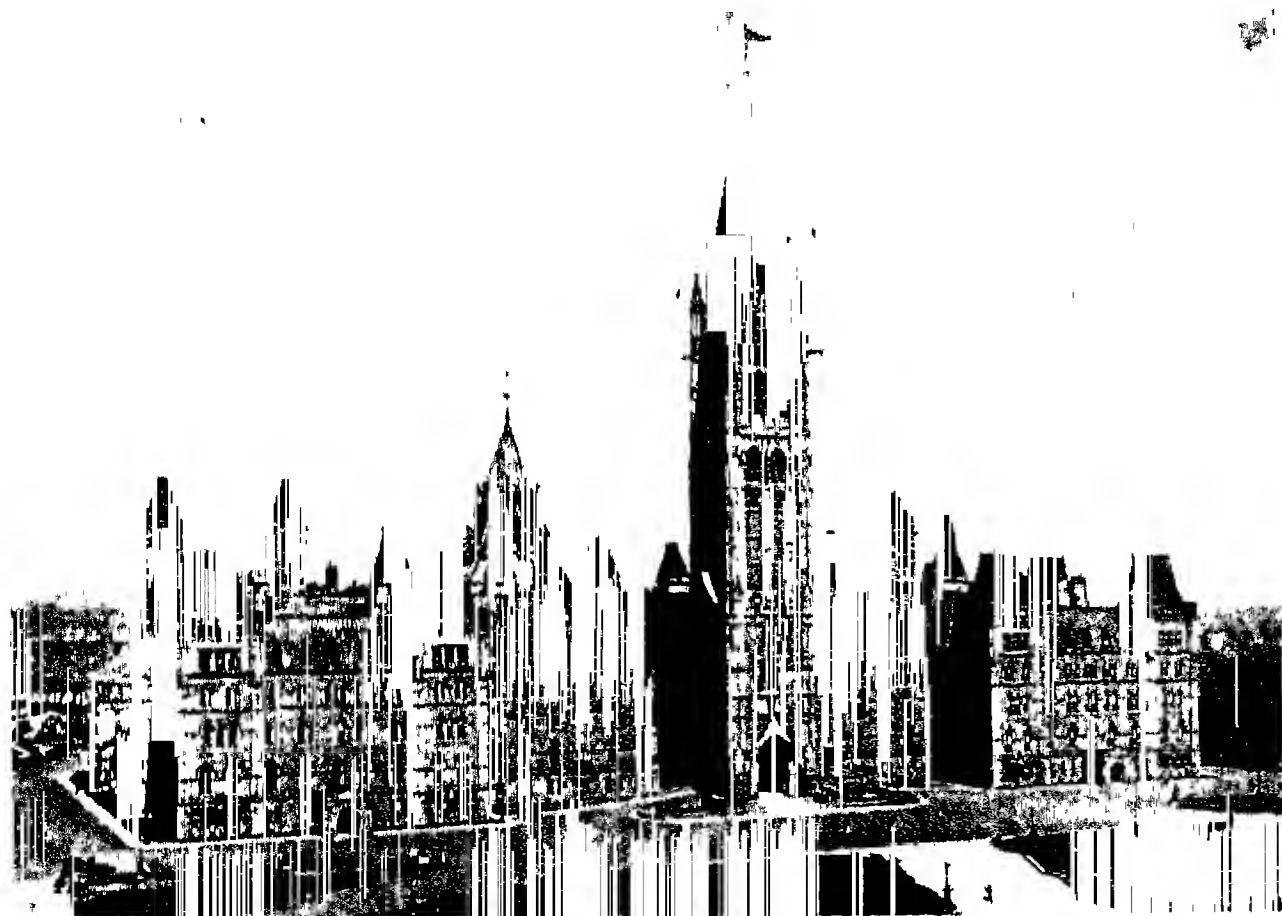
WELFARE. Constitutionally, the social welfare services are under the control of the provinces, but an act of 1940, effective July 1, 1941, amending the British North America Act, 1867, gave the federal govt. jurisdiction over unemployment insurance, which is administered by the unemployment insurance commission. A Family Allowances Act came into force in 1944 to "equalise opportunity for the children of Canada." Under it, allowances are paid monthly to mothers, and must be spent exclusively for the maintenance and education of the children. The Old Age Security Act ensures a pension to all over 70, as well as special help for those in need. Much of the welfare money is dispensed by the provinces under agreement with the federal govt. Each province

to bogganing, skating, ice-yachting, and curling are everywhere enjoyed with enthusiasm. E. and W. the country is the haunt of big game, and the lakes and rivers abound in fish: salmon and trout in British Columbia; trout, bass, and maskinonge in the maritimes, Quebec, and Ontario. The pride of Canada is its national parks, regions of outstanding beauty set aside as vacation-lands. There are 28 of them, with a combined area of 29,000 sq. m.

British North America Act

CONSTITUTION ; JUDICIARY ; FINANCE. The Canadian constitution is both written and unwritten. The most important document is the British North America Act of 1867. This act established in Canada a government similar to that in Great Britain, yet it divided the legislative and executive authority between the federal and provincial govts. Thus, for the first time in history, the cabinet system of government was combined with the United States principle of federalism. The British parliament was made the trustee of this arrangement. Under the B.N.A., the constitution could be amended only through application to the British parliament. In 1949, at Canada's request, the Imperial parliament in London passed an act amending the B.N.A. permitting the federal parliament to amend the constitution, except in regard to the rights and privileges of the provinces, without reference to London. Under the B.N.A. Act the provinces had considerable authority; but two world wars and a depression strengthened the centralising impulse. After each census, seats in the house of commons are readjusted on a population basis; the total representation following the 1951 census, with Quebec being guaranteed 75 seats, was 265. Elections must be held once every five years. The senate is the upper house. It has little active influence over bills yet performs valuable service. The 102 senators are summoned for life with equality of representation for 4 regional divisions. Both senators and members receive allowances totalling \$6,000. The third branch of the federal parliament is the crown, as represented by the governor-general. The provincial governments have political institutions and constitutional usages similar to those in the federal sphere.

All judges (except in the courts of probate in New Brunswick and Nova Scotia) are appointed by the



Canada. Parliament House at Ottawa; in the lofty tower is a memorial chamber to Canadian war dead, and above this a carillon of 53 bells

quality of its performances. The large cities have professional repertory theatres. The C.B.C. contributes much to developing a Canadian theatre.

THE PRESS. No city is without its daily paper, and no town without its weekly sheet. There are 95 daily and some 860 weekly papers with a combined circulation of about 9,000,000 copies. All papers, without regard to political affiliation, receive the services of the Canadian Press, which has its private wires from coast to coast, and which, through alliances with e.g. the Associated Press and Reuters, gathers news from all over the world. Canada has produced

has its own Workman's Compensation Act, and legislation governing wages and hours of labour.

RECREATIONS. Canada is the land of out-of-doors. Ice-hockey, baseball (the "ball game"), and rugby football are the national games, and the fortunes of competing teams are followed with the keenness given to cricket and football in England. Spectators at games participate vociferously and "rooting" is all part of the fun. Golf and tennis are popular, football is widely played, and there is some cricket on the W. coast.

The Canadian winter, with its dry, invigorating atmosphere, is a great time for sport, and skiing,

federal govt. from the bars of the respective provinces. They are guaranteed tenure of office during good behaviour and can be removed only by joint address of the senate and house of commons. The supreme court of Canada, est. 1875, has appellate jurisdiction from all the courts of the provinces. With the abolition of appeals from Canada to the privy council in the U.K. in criminal cases, 1933, and civil cases, 1949, decisions of the supreme court of Canada became final and conclusive.

Finance and Currency

National income in 1952 was computed at \$18,135,000,000, a figure increased in succeeding years. The net public debt in 1953 totalled \$11,161,734,269. Total expenditure by the dominion government during the same year reached \$4,337,275,512, while total revenue was \$4,360,822,789. The largest yield came from income tax, followed by excise taxes and customs duties.

Canada has two state-owned banks: the Bank of Canada, est. 1935, and the Industrial Development Bank, est. 1944. The Bank of Canada, whose function is in the main regulative, possessed from 1950 the sole right of note issue, a right shared until then by the following chartered banks: Canadian Bank of Commerce, Banque Canadienne Nationale, the Dominion Bank, the Bank of Montreal, the Royal Bank of Canada, the Bank of Nova Scotia, the Provincial Bank of Canada, the Bank of Toronto, and Barclays Bank (Canada). The Industrial Development Bank finances industrial projects; its capital of \$25 millions was subscribed by the Bank of Canada. The currency of Canada issued by the Royal Canadian mint is: silver—\$1, 50 c., 25 c., 10 c.; nickel—5 c.; tombac—5 c.; steel—5 c.; bronze—1 c. Notes of 10 values from one to one thousand dollars are issued.

The adoption of the dollar as the unit of currency throughout Canada was fortuitous. When Canada became British in 1763 all kinds of coins were in circulation there and in the colonies to the S., the most important being the Spanish dollar. The United States adopted the dollar and a decimal coinage; Canada, still without an official currency, followed suit. The U.K. in 1825 attempted, but failed, to introduce British currency, and in 1858 Canada passed an act requiring govt. accounts to be kept in dollars and cents.

HISTORY. Although John Cabot from Bristol in 1497 reached the shores of the continent, and Jacques Cartier from St. Malo entered the Gulf of St. Lawrence in 1534, the history of Canada properly begins with the foundation by Samuel de Champlain of the first settlement of Europeans, at Port Royal (now Annapolis Royal, N.S.), in 1604. Four years later he founded Quebec, a site chosen with a soldier's eye, for it stands high on the bluffs commanding the St. Lawrence. The main motive for the settlement of the country was the fur trade, and in the century and a half that followed the struggle for supremacy in Canada between French and British has been described as "a fight for the possession of the skin of a rat." French aims were not wholly commercial, and the charter of "the company of one hundred associates," formed in 1627 by Richelieu to support the new settlement, assigned first place to missionary labours.

Missionaries and Explorers

The earliest spiritual workers and explorers (Père Marquette discovered the Mississippi) were the Jesuits, and some of the other orders—Récollets, Sulpicians, Ursulines—sent from France at this period are active in the province of Quebec to this day. In 1613 the English from Virginia almost completely destroyed the settlement at Port Royal, and 16 years later Quebec itself surrendered to an expedition sent out from England under David Kirke. All was restored to France in 1632 by the treaty of St. Germain-en-Laye, but the company of one hundred had received its quietus. It gave way in 1664 to a new company of the West Indies, which signalled its inception by sending out a bride ship in 1665.

Despite a vigorous policy of intensive immigration, the new company was no more successful in inducing the French to leave France for Canada than its predecessor, and in 1674 its charter was revoked. Since 1663 the country had been governed as a royal province by a sovereign council of New France, and the first governor to leave a lasting impress, especially in his control of the Indians, was Louis de Buade, comte de Frontenac. He had been preceded a few years earlier by the intendant, Jean Talon, whose perception of the trading possibilities around him gave an impulse to commercial development which has had lasting effect on the economic life

of Canada. Frontenac, an imperious ruler, met his match in the no less imperious prelate Laval-Montmorency, who had determined that Canada should be governed by the Church. The two men quarrelled, and Frontenac was recalled. With his strong hand removed, the Indians rose and almost overwhelmed the colony. The massacre of the settlement of Lachine, and a later incident of the heroism of 14-year-old Madeleine de Verchères in an Iroquois attack on the fort below Montreal, are undying stories in French-Canadian history. Frontenac was sent back in 1689 to restore the situation. He found that the Iroquois Confederacy was not the only danger he had to face. In 1670, Charles II had granted a charter to the Governor and Company of Adventurers of England Trading into Hudson's Bay, and the pressure of commercial rivalry from the N. was beginning to make itself felt.

In the S., the British colonies were claiming the country around the Great Lakes, and there was a ruthless border warfare. In 1690, Sir William Phipps, sailing from Boston, captured Acadia (the Nova Scotia founded by Sir William Alexander in 1629, but surrendered under the treaty of St. Germain-en-Laye), and essayed an attack on Quebec, but was beaten back. The French in turn, under D'Iberville, seized every British settlement in Newfoundland, and occupied the Hudson's Bay Company post at Port Nelson. Everything was restored on both sides by the treaty of Ryswick, 1697.

British-French Rivalry

Frontenac died the following year. He had subdued the Iroquois, beaten back the British, and might well have thought New France permanently secure. But the peace proved only a truce, and war was renewed in 1701 when a further effort under Sir Hovenden Walker was made in 1711 to take Quebec. Again it failed, but again Acadia fell into British hands, this time for good, for behind the treaty of Utrecht, 1713, lay the victories of Marlborough, and France surrendered her claims to Hudson Bay, Newfoundland, and Nova Scotia. She still held the shores of the St. Lawrence, and to command its mouth she built the fortress of Louisburg, on Cape Breton Island. In 1744 the French made a sudden and abortive attack on Nova Scotia, and in retaliation the British colonists planned and effected the capture of Louisburg

in the following year. Much to their disgust, it was handed back to France at the peace of Aix-la-Chapelle in 1748.

The position at this time was that the French claimed all but the Atlantic seaboard, and the British all but the valley of the St. Lawrence. With claims so vague, clashes were inevitable, and it was in one of these, at Fort Duquesne, that a young officer of the Virginia militia—Major George Washington—first appeared on the stage of history. In 1755 occurred the most memorable event of the time, the deportation of the French from Acadia, a measure that inspired Longfellow's poem *Evangeline*. One year later the Seven Years' War broke out. The "wonderful year" 1759, which saw British arms victorious in every quarter of the world, culminated in the capture of Quebec by Wolfe on Sept. 13. In 1760 the French army surrendered at Montreal, and by the peace of Paris, 1763, all New France was ceded to Great Britain.

Early Difficulties

The early years of British rule—a military government—were uneasy, but the national genius for empire was well demonstrated in the framing of the Quebec Act which, in 1774, confirmed the French Canadians in their laws, customs, and ecclesiastical privileges. The fruits of it were seen almost immediately when the revolt of the American colonies in 1775 found these new subjects solidly loyal to the crown. The American revolution profoundly affected the life of Canada, for at its close thousands of New England colonists—United Empire Loyalists—who desired to live under the British flag flocked to Nova Scotia, New Brunswick, and Ontario. Their coming brought new problems of government, and in 1791 the Constitutional Act was passed by the British parliament, separating Canada into two parts—Lower Canada, chiefly French, and Upper Canada, chiefly British. In the war of 1812 the United States made a great effort to annex Canada to the Union; there was a varying conflict, but in the end the treaty of Ghent, 1814, left everything unchanged.

The years that followed saw the rise of political faction, which came to a head in 1837 when armed revolts under Louis Joseph Papineau in Lower Canada, and William Lyon Mackenzie in Upper Canada, brought the home government to

send out Lord Durham to report on the affairs of British North America. His report, published in 1839, resulted in the Union Act of 1840, under which Upper and Lower Canada were united and given equal representation in a common legislative assembly. Though the union did not work well, Canada prospered commercially, especially during the American civil war, and with this expansion the idea of a federal union between the two Canadas and Nova Scotia, New Brunswick, and Prince Edward Island took shape. On July 1, 1867, with the passing of the British North America Act, the federation was realized and the Dominion of Canada came into existence. The dominion at that time comprised Ontario, Quebec, New Brunswick, and Nova Scotia. The cession in 1869 of the Hudson's Bay Company's territorial claims in the N.W. (which led incidentally to the short-lived Red River rebellion) brought to the dominion an immense accession of territory. Manitoba joined the confederation in 1870; British Columbia in 1871; Prince Edward Island in 1873; the Yukon in 1898; Saskatchewan and Alberta in 1905; Newfoundland in 1949; the districts of Mackenzie, Keewatin, and Franklin of the North-West Territories were created in 1920. The first prime minister of the dominion was Sir John Macdonald. Defeated on the Canadian Pacific rly. question in 1872, he was returned to power in 1878 on a platform of protection for home industries. The success of his "national policy" confirmed him in office until his death in 1891, and the Conservative party in power until 1896. With modifications, the national policy has remained the basis of Canadian economy under all subsequent administrations, Conservative and Liberal alike.

Creation of the C.P.R.

One of the conditions under which British Columbia entered the confederation was the construction of a transcontinental railway within ten years. Scandals connected with the project had led to the downfall of the first Macdonald administration. Under the second, a vigorous railway policy was inaugurated; a grant of \$25,000,000 and a land grant of 25,000,000 acres were made to a new company, work was begun, and with the driving of the last spike by Donald A. Smith (Lord Strathcona) on Nov. 7, 1885, the

Canadian Pacific rly. became an accomplished fact. Dissension in the Conservative ranks after Sir John Macdonald's death led to a series of short-lived administrations, and in 1896 the Liberals were returned under the leadership of Sir Wilfrid Laurier. His premiership, which lasted until 1911, was marked by a prosperity which continued under the premiership of the Conservative Sir Robert Borden, 1911–1920, and under Arthur Meighen, 1920–21, after which the Liberals with W. L. Mackenzie King as premier came into office, 1921–26. There was a brief administration under Meighen from June to Sept., 1926, when Mackenzie King was again returned, 1926–30. Under R. B. Bennett (Viscount Bennett) there was a Conservative administration, 1930–35, marked by the inauguration of imperial preference and the establishment of the Bank of Canada. The Liberals held office again from 1935, winning the 1940, 1945, 1950, and 1953 elections; Mackenzie King retired in 1948, Louis St. Laurent becoming premier.

The Two Great Wars

The Great Wars had as unsettling an effect in Canada as elsewhere, and the old party divisions gave way to new combinations. Both industry and agriculture becoming politically organized, new parties such as the Cooperative Commonwealth Federation (C.C.F.), the Labour Progressive party, the Social Credit League, the National Progressive party, and the Bloc Populaire Canadien made their appearance in politics.

After the Second Great War Canada assumed a larger rôle in international affairs as exemplified by her membership in N.A.T.O. and her participation in the Korean War 1950–53.

CANADA AT WAR. Canada's baptism of fire was the South African War, 1899–1902, when some 3,000 officers and men were dispatched by the dominion govt. to join the Imperial forces. They greatly distinguished themselves at Paardeburg. In 1914, at the outbreak of war with Germany, the Canadian parliament voted the raising of a contingent for foreign service, and by Oct. of that year 33,000 Canadian troops had landed in England. In Feb., 1915, this 1st Canadian contingent was sent to Flanders, and there for the next three years, augmented by the dispatch of three more contingents and becoming an army

corps under the command of Sir Julian (afterwards Lord) Byng, it covered itself with glory in a series of resounding exploits—2nd battle of Ypres, where it beat back the German gas attack; the battles of Festubert and Givenchy; the capture of Courcellette; the storming and capture of Vimy Ridge; the battle of Loos and the capture of Hill 70. Later, under the command of General Sir Arthur Currie, it performed a brilliant feat of arms in the capture of Passchendaele, broke the Drocourt-Quéant line, captured Bourlon Wood, Cambrai, Denain, and Valenciennes, and on the morning of Nov. 11, 1918, entered Mons. It suffered 215,545 casualties.

In the Second Great War 39 of every 100 Canadian men between the ages of 18 and 45 passed through the armed forces. Canada entered the war in 1939 with an army of 4,500, an air force of 4,000, and a navy of 17 ships. At the close of the war she had 675,564 men under arms, 45 operational air squadrons in action, and 373 vessels on escort and patrol duty. The first Canadian troops landed in England in Dec., 1939, but it was not until Aug. 19, 1942, that they came to grips with the enemy in a combined raid on Dieppe, where Canadian casualties were 3,350 out of 5,000 engaged. On July 10, 1943, the Canadian 1st division, with British and U.S. forces, landed in Sicily, and after a 39-days' campaign invaded the Italian mainland. Operating with the Allied 8th army, it took part in the assault that cracked the Hitler line in May, 1944, and entered Rome on June 5. Moving north again, it was an important factor in breaking the Gothic line, and distinguished itself in actions across the Ronca and Savio rivers, and along the Lamone river and Naviglio canal. Ravenna fell to the 1st Canadian corps on Dec. 4.

1st Canadian Army Formed

Meanwhile, in the invasion of Normandy, various other Canadian formations went into action across the beaches, and took part in the capture of Caen in July, 1944. The formations were the basis of the 1st Canadian army, completed by British, Polish, Czecho-Slovak, and other formations, which was constituted July 23 under the command of the Canadian Lt.-Gen. H. D. G. Crerar. This army took Falaise on Aug. 17, and, crossing the Seine and Somme rivers, swept on to isolate the Channel ports in one of the fastest moving opera-

tions of the war. It captured Calais in the closing days of September. After an exhausting campaign amid the dykes and ditches of the Netherlands, the 1st Canadian army cleared the provinces of Gelderland, Friesland, and Groningen, and was closing in on Emden and Wilhelmshaven when the German armies facing it unconditionally surrendered on May 4, 1945.

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Canada Balsam. Substance containing oils and resin derived from the *Abies balsamea* of Canada. It forms an adhesive varnish when dried. Two of its chief uses, for which its refractive index makes it suitable, are for mounting objects on glass slides for the microscope; and as a cement for the component lenses of microscope objectives.

Canada House. London headquarters of the Canadian government. It has served since 1925 as the offices of the High Commissioner for Canada and his staff. The building, which was reconstructed from the premises of the Union Club, designed by Sir Robert Smirke (1787-1867) in 1824, is at the corner of Cockspur Street and Trafalgar Square, S.W.1.

Canada Steamship Lines. Canadian steamship company. It is an amalgamation of the largest companies in Canada. With 60 steamers, it operates the major part of the passenger and freight traffic between the ports on the Great Lakes and Montreal. It also owns two hotels, at Murray Bay and Tadoussac; and has a controlling interest in six large shipyards in Canada. The head office of the company is at Montreal, its London office at 44-46, Leadenhall St., E.C.3.

Canadian. River of the U.S.A. Rising in the N.E. of New Mexico, it flows mainly east through Texas

and Oklahoma to join the Arkansas about 35 miles S.W. of Muskogee. It is about 900 miles long, rather shallow, and of little importance for navigation.

Canadian Bank of Commerce. Canadian banking company. Established in 1867, it took over the bank of British Columbia in 1901, the Eastern Townships bank in 1912, the bank of Hamilton in 1924, and the Standard bank of Canada in 1928. It has some 700 branches throughout Canada, in New York city and elsewhere in the U.S.A., and in the West Indies. Its paid-up capital is \$37,500,000. Its head office is at Toronto, its London office at 2, Lombard Street, E.C.3.

Canadian Guards, THE REGIMENT OF. Body formed in Oct., 1953, as an active force (regular) regiment comprising four battalions. The first and second battalions had previously been the third battalions of two veteran Canadian regular formations—the Royal Canadian Regiment and Princess Patricia's Canadian Light Infantry. The third and fourth battalions had previously been the 1st and 2nd Canadian Infantry battalions, active force units specially raised in 1951 for service in Korea and Germany. In 1954 as part of a general scheme for the reorganization of the Canadian forces two reserve force (militia) formations, the Governor-General's Foot Guards and the Canadian Grenadier Guards, were linked with the Regiment of Canadian Guards and became its fifth and sixth battalions. The Governor-General's Foot Guards, an Ottawa Militia regiment, was formed in 1872 as a special unit enjoying precedence over all other units of the Canadian infantry militia. The Canadian Grenadier Guards were formed at Montreal in 1859, but did not become Guards until 1911.

Canadian Mounted Police, ROYAL. Civil police force maintained by the federal government of Canada. Established in 1873 with a strength of 300 men as the North-West Mounted Police (*q.v.*), its duties were confined to what was then called the North-West Territory. In 1905 the force received the prefix Royal, and in 1920, when the extension of government activities necessitated such a force, its jurisdiction was extended to the whole of Canada, and the force received its present title. It is administered by the Canadian minister of justice.

Any of the Canadian provinces may enter into an agreement with



1. Phrygian. 2. Ancient Egyptian skull-cap. 3. Ancient Greek felt cap. 4. Cap of priest in Ancient Rome. 5 and 6. Anglo-Saxon. 7, 8, and 9. Anglo-Norman. 10. Spanish, 13th century. 11. English, c. 1300. 12. Cap of Doge of Venice, c. 1300. 13. English, 14th cent. 14. Italian, c. 1400. 15 and 16. English, c. 1400. 17 and 18. French, c. 1400. 19. Roundlet, 15th cent. 20. Jewelled bag cap, 15th cent. 21, 22, and 23. Middle 15th cent. 24. English, late 15th cent. 25. Burgundian, 1456. 26, 27, and 28. Late 15th cent. 29. Cardinal's, c. 1500. 30. Bishop's, c. 1500. 31. French,

16th cent. 32. Milanese, 16th cent. 33, 34, and 35. English flat caps, 16th cent. 36. Middle 16th cent. 37. German, c. 1550. 38. Cap of Knight of Garter, 16th cent. 39. English, 16th cent. 40. and 41. Indoor caps, 17th and 18th cent. 42. Running footman's cap, early 18th cent. 43. Grenadier cap, middle 18th cent. 44. French Cap of Liberty, late 18th cent. 45. Jacobin cap, worn doubled over. 46. Laplander's. 47. Persian. 48. Russian. 49 and 50. Spanish. 51. Polish. 52. Highland Chief's. 53. Huntsman's. 54. College cap. 55. Tarbush. 56. Tweed cap, 20th cent.

CAPS OF VARIED FASHION WORN IN MANY AGES AND IN MANY LANDS. See page 1733

the R.C.M.P. to enforce the laws and the criminal code of the province upon payment for its services: such agreements are in force in six provinces. A similar agreement can be made by cities and municipalities, and in more than 50 towns the R.C.M.P. enforces by-laws. Since 1932 the R.C.M.P. has been responsible throughout Canada for preventing smuggling and enforcing the provisions of the excise acts. It also deals with the suppression of the drug traffic and polices government buildings.

Consisting of 4,700 officers and men, the R.C.M.P. is organized into 13 divisions. Men enlist for five years, and the officers are commissioned by the crown.

The force has been to a considerable extent mechanised, and has motor vehicles, aeroplanes, and motor boats.

The uniform is a scarlet tunic, gold-striped blue breeches, and hat. During the Second Great War the R.C.M.P. furnished a provost company of 184 officers and men to the Canadian army; much of its marine section was taken over by the Royal Canadian Navy, and its aircraft by the Royal Canadian Air Force. In 1940-42 the R.C.M.P. schooner *St. Roch* completed the voyage through the North-West passage. See illus. page 1695.

Canadian National Railways. System incorporated in Canada, Oct. 10, 1922. The largest railway system on the American continent and the only railway serving all ten provinces of Canada, C.N.R. is a transcontinental system operating 24,359 miles first main track; total all tracks, including spurs, sidings, etc., is 33,668 miles. It operates throughout the Dominion of Canada from the Atlantic to the Pacific Ocean, and has international lines in 12 states of the U.S.A. An amalgamation of 90 different companies came under government control, including the Canadian Northern rly. in 1918; the Grand Trunk rly. was absorbed in 1923. The C.N.R. operates also the lines previously owned by the Intercolonial rly., the National Transcontinental, the Prince Edward Island rlys., and the Hudson Bay rly.

It has its own Express company for parcels, livestock, and valuables carried on passenger trains, its own telegraphs, and a chain of high-class hotels. Canadian National steamships link Canadian Atlantic ports and Boston, U.S.A., with Bermuda, the British West

Indies, and British Guiana, and the company has boat services on the Great Lakes and along the Pacific coast, as well as train ferries on Lake Michigan and crossing to Prince Edward Island in the Gulf of St. Lawrence.

The C.N.R. has an intricate network of lines through the industrial areas of Ontario and Quebec, with main lines serving every port of the dominion. The bulk of the mining areas and many of the new mining prospects are situated on its lines, and the strategic position of the lines reaching out across the prairies in western Canada enables the company to perform the biggest service of all agencies in moving Canada's agricultural produce to the world market it enjoys.

The 1954 annual report showed operating revenues as \$640,637,280 and expenses \$626,465,374, leaving a net operating profit of \$14,171,906 (approx. £5,000,000). After deduction of interest charges, taxes, equipment rents, and other income accounts, a deficit of \$28,758,098 (approx. £10,000,000) was reported. The head office is at Montreal; there are branch offices in major cities throughout the world.

Canadian Pacific Railway. Canadian railway company, one of the great transcontinental lines. It was incorporated in 1881 to carry out the delayed undertaking given to British Columbia when that province entered the dominion. Earlier attempts to complete the promised line had failed; then Donald A. Smith and George Stephen (later Lords Strathcona and Mount Stephen) took up the scheme. They and their associates received from the dominion government some partly constructed rly., a sum of \$25,000,000, and 25,000,000 acres of land. The last spike was driven in by Smith on Nov. 7, 1885, at Craigellachie in the Rocky Mts., and the first train ran from Montreal to the Pacific in June, 1886.

The main line (2,882 m.) runs from Montreal via Sudbury, the N. shore of Lake Superior, Winnipeg, Regina, Calgary, over the Rocky Mts. to Vancouver, its Pacific terminus. Secondary main lines run from Montreal to Quebec, St. John, and Toronto, from which a line runs to Detroit. Another is from Winnipeg to Edmonton, and another from Medicine Hat via Lethbridge and Nelson to Vancouver, crossing the Rockies S. of the main line. Branch lines, in both east and west, radiate from these.

By controlling some American lines (of which the Minneapolis, St. Paul, and Sault Ste. Marie is the largest) and by traffic arrangements with others, the C.P.R. has the entry into numerous U.S. cities, including Chicago, Boston, St. Paul, Minneapolis, and Spokane.

The company has substantial interests in hotels and in coastal and lake steamers. It owns Atlantic steamships operated by a subsidiary company, Canadian Pacific Steamships Ltd.; and air-lines operated by another subsidiary, Canadian Pacific Airlines, Ltd. The company's capital is more than \$482 million. At Dec. 31, 1954, it controlled more than 17,000 m. of railway in Canada and more than 4,000 m. in the U.S.A. Its rolling stock consists of 1,520 steam locomotives, 450 diesel units, 2,890 passenger carriages, and 81,120 goods wagons.

Canadian Pondweed (*Elodea canadensis*). Waterweed of the monocotyledonous family Hydrocharitaceae, native to North America. It has long, slender, brittle stems, growing wholly submerged; roots may be produced at the nodes. The stalkless oblong leaves are usually in whorls of three. The minute greenish-purple flowers float at the surface, where the male flowers break off and drift among the floating females. The male flowers are rarely seen in Great Britain where the plant is chiefly propagated by the breaking off and rooting of pieces of stem. It is believed to have been introduced to Europe in this way, perhaps by means of a piece that adhered to the foot of an aquatic bird, and was washed off in European waters. It was found in co. Down, Ireland, in 1836, and was identified in England about five years later. It spread rapidly through all the waters of the British Isles, choking rivers, streams, and canals with its net-like growth. After a few years it became less vigorous, and is now plentiful only locally. Canadian pondweed is often used in biological laboratories for physiological experiments.

Canadian Shield. Vast V-shaped area of 1,800,000 sq. m. surrounding Hudson Bay and extending from the coast of Labrador west to the Interior Plains Region and south to the international border with the U.S.A. Of generally low relief, it is the great lake region of the world. Its rocks are all very old and contain great

quantities of minerals, particularly metals. As an obstacle to exploration, easy settlement, and transport it was of great importance in the history of Canada.

Canal (Lat. *canalis*). An artificial open water-channel, used to carry water for irrigation, town supply, or drainage, or for the purposes of navigation. Canals of the first class are more properly called aqueducts (*q.v.*).

Navigation canals fall naturally into two classes: (1) those which have practically the same level throughout, a comparatively small class, *e.g.* the Suez, Kiel, and Corinthian canals; (2) those which cross ground higher than the water level at their extremities, and are divided into steps or reaches at different levels.

The longitudinal section of a canal is decided by physical conditions and by considerations of expense and time of transit. Modern excavating and disposal machinery and methods of construction allow of deeper cuttings in place of tunnels. Transference of vessels from one level to another is made by a lock (*q.v.*) or some mechanical device.

Lifts and inclines provide an alternative to locks. Three types are employed. *Inclined planes* are suitable for smaller boats, which are taken bodily from the water on a wheeled carriage running on rails. This type has been replaced by the *inclined lift*; here the boat is carried in a tank of water, which, in turn, is carried on a wheeled track. *Vertical lifts* are the third type; here the boat is floated into a counter-balanced tank, gates being provided, and raised vertically. Motive power may be either hydraulic or electric. The Anderton lift on the Weaver Navigation in Cheshire, constructed in 1875, is the only example now in use in Great Britain.

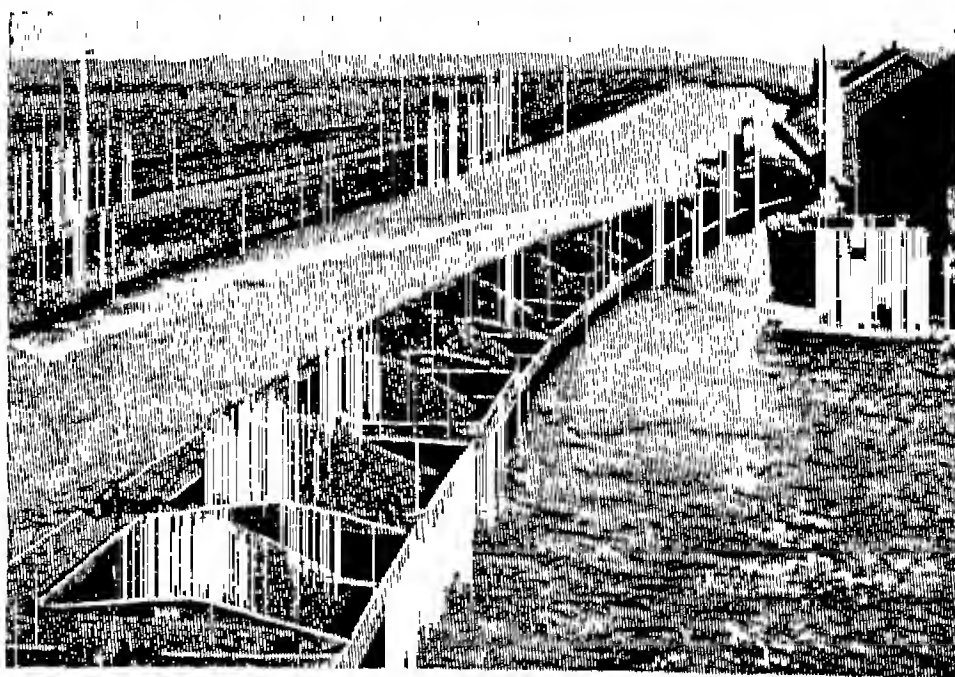
Lifts and inclines save time in transit and in water consumption, but are unsuited for the transfer of the larger ocean-going vessels. In general, they are best suited for inland situations where traffic is sufficiently dense to cover the working costs. Locks have the advantage of simplicity and of low working costs.

The traffic capacity of a canal is limited by its depth, and to a smaller extent by its bottom width. The depth decides the maximum size of boats that can use it; the width and depth combined, ease of navigation. The bottom width should be at

least twice the beam of the largest boat plus 4 ft. which, when loaded, can pass through it with not less than 18 ins. of water under its keel, and the cross area should be six times the greatest submerged section of the boat to give plenty of room for displaced water to move easily between the boats and the sides of the canal without too much wash.

In the early days of canal construction, excavation was done by "navigators" (navvies) with hand tools; under modern conditions, excavating machinery is invariably employed—diesel excavators, draglines with long booms and buckets of large capacity, tractors and dump wagons, floating dredgers and rock breakers, etc. Water-tightness was secured by puddle clay linings which, however, are seldom necessary for canalised rivers. The slopes of the banks are regulated by the nature of the soil, and require to be well drained. Unprotected slopes suffer from erosive action of waves formed by the passage of vessels. The most common materials for bank protection include mass concrete walls, reinforced concrete piling, interlocking steel sheet piling; for bed work, reinforced concrete and bitumen sheeting; for river reaches, timber sheeting and fascines are still used.

Aqueducts are sometimes necessary to carry canals over roads,



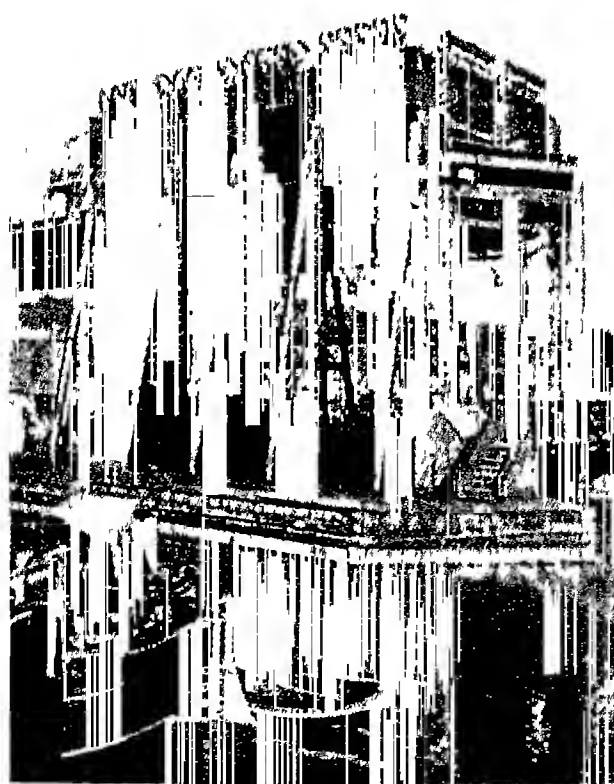
Canal. Compartment tug on the Aire and Calder Navigation system towing twelve compartment boats loaded with coal to Goole for transport by sea

railways, and across valleys and rivers. For the early canals, many aqueducts were built up of cast-iron segments, or in brickwork and masonry; more recently, a reinforced concrete lined with asphalt and faced with blue bricks in cement construction has been adopted. If the aqueduct is over a navigation, part of it may be made to revolve like a swing bridge; *e.g.* at Barton, where the Bridgewater canal crosses the Manchester ship canal in a large trough.

Tunnels are often necessary, especially at summit levels in passing from one river basin to another; the width is generally restricted to single-line working for maximum beam of craft using the waterway.

The most important of the world's ship canals are the Panama, Suez, and Kiel. The most important in England is the Manchester ship canal; in Russia, the White Sea and Don-Volga canals; in Belgium the Albert canal; in Greece the Corinth canal. Schemes projected, completed, or put in hand in the 20th century include the development of the inland waterways of the U.S.A. (in the Mississippi river basin alone there are more than 11,000 m. of navigable channels); in Canada, the reconstruction of the Welland ship canal, connecting the lakes of Ontario and Erie across the Niagara peninsula, to take vessels of up to 25-ft. draught; and the gigantic plan for creating a St. Lawrence Waterway to make it possible for seagoing vessels to reach the western shores of Lake Superior.

In England, following the amalgamation in 1920 under the name of the Grand Union canal of the five separately owned canals forming the route between London and Birmingham, fifty-two locks in Warwickshire were rebuilt to barge standard, the work



Canal. Anderton lift on the Weaver Navigation Canal, Cheshire

being completed in 1936, during which year the rebuilding of the locks on the Nene between Peterborough and Northampton to barge standard was also completed. In addition, a tidal lock was built near Wisbech and the river widened and deepened, one road bridge reconstruction making it possible for vessels of 400 tons to reach Peterborough.

BRITISH CANALS. The waterways of England and Wales, forming part of a connected system which lies chiefly in the Midlands and southern parts of the northern counties, take roughly the form of a cross, connecting the estuaries of the Thames, Mersey, Trent, and Severn; they have no connexion with the Scottish canals. The dimensions of barges operating on the principal waterways in Great Britain vary within wide limits; from 120 ft. length by 17 ft. 6 in. beam by 7 ft. 6 in. draught and 12 ft. 9 in. headroom, to 71 ft. length by 7 ft. beam by 3 ft. draught by 6 ft. 6 in. headroom. Thus inter-canal communication between the four estuaries is limited to the smallest boat of 7 ft. beam.

The more important canals of England, Scotland, and Wales, with their lengths, are shown in the table in the next column.

ORGANIZATION. The total mileage of canals and inland navigations in Great Britain, excluding sections which have been abandoned by statutory procedure, is about 2,419. About 2,280 m. are in England and Wales. Included in the total are 444 m. not used for the passage of traffic. Of the total mileage 803 m., or approximately one-third, was owned

ENGLAND AND WALES	MILES
Aire and Calder	66
Birmingham Canal Navigation	155
Bridgewater Canal	40
Calder and Hebble Navigation	26
Coventry Canal	32
Gloucester and Sharpness ship canal	16
Grand Union	240
Lee and Stort Navigation	41
Leeds and Liverpool	145
Manchester ship canal	36
Nene River Navigation	90
Ouse River (Yorks)	43
Oxford	78
Rochdale	35
Severn Navigation	42
Sheffield and South Yorks Navigation	43
Shropshire Union	78
Staffordshire and Worcester	50
Thames River	125
Trent Navigation	69
Trent and Mersey	111
Weaver Navigation	20
Worcester and Birmingham	29
SCOTLAND	
Caledonian	60
Crinan	9
Forth and Clyde	35
Union	31

or controlled by the railway companies, and passed with them into national ownership Jan. 1, 1948, remaining for the time being under the management of the railway executive. With some exceptions (e.g. the Manchester ship canal), the rest of the English canal system passed on the same date to the control of the British transport commission. The companies operating barges on the canals

were also brought under the control of the commission.

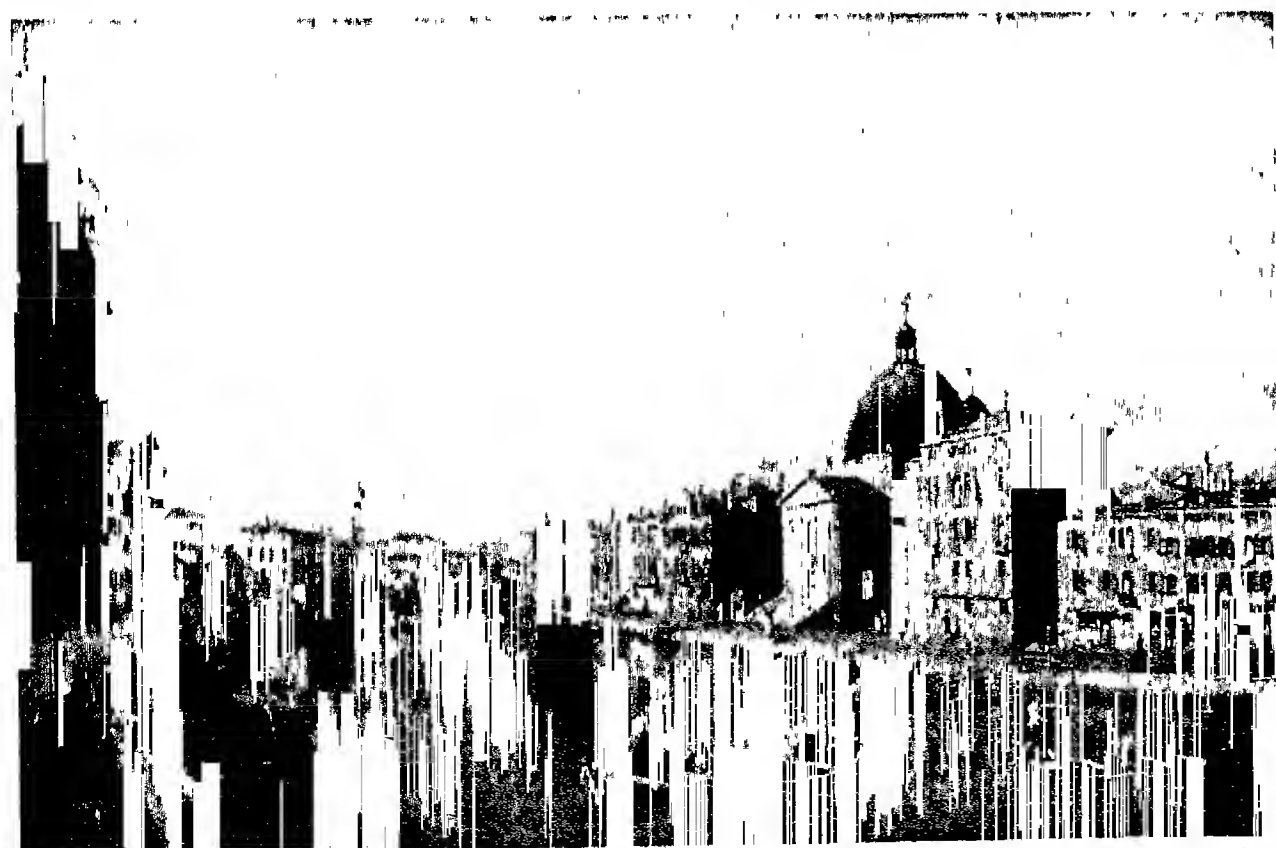
The commission divided the canals and other inland waterways into five sections: northern, managed from Leeds; north-western (Northwich); eastern (Nottingham); western (Gloucester); and southern (London). Scottish canals became national property in March, 1948. In the course of the following years, sections of the canals that had fallen into disuse were abandoned and filled in. *Consult* Artificial Waterways of the World, A. B. Hepburn, 1914; *Waterway Engineering*, I. O. Franzuis, trans. L. G. Straub, 1936; *Narrow Boat*, L. T. C. Rolt, 1944; *Handbook on Inland Waterways of England and Wales*, Canal Joint Committee, 1945; *British Canals*, C. Hadfield, 1950.

Canal du Nord. Waterway planned to connect the Sensée canal at Arleux and the Oise canal at Noyon, in northern France. The S. Quentin canal, constructed by Napoleon I, having proved inadequate to the growing traffic from the north to Paris, a new canal, the Canal du Nord, was decided on and work on it began in 1907. During the First Great War what had been done was partly wrecked, and subsequently its completion became a matter of controversy, and up to 1957 no decision had been taken.

Canaletto OR CANALE, ANTONIO (1697-1768). Venetian painter. Born in Venice, Oct. 18, 1697, he was trained by his father, a scene-painter, and under Pannini in Rome. Settling in Venice, he painted the life and architecture around him. Mainly through the advocacy of the collector, Joseph Smith, he sold many pictures to Englishmen; and in 1746 he settled in London, remaining there for 10 years. His paintings of the Thames illustrate well his beautiful handling of paint, combined with strict factual accuracy and an inevitable rightness of composition, which together make him a minor master. Examples of his work are to be found in the National Gallery and Wallace Collection, London. His nephew and pupil, Bernardo Bellotto (c. 1724-80), also called Canaletto, followed him closely in style and subject, but did not equal him.



Canaletto,
Venetian painter



Canaletto. The Grand Canal, with S. Simeone Piccolo, Venice, a typical example of this artist's work
Wallace Collection

Cananea. Town of Mexico, in Sonora state. It is the terminus of a rly. into Arizona. Here the Cananea Consolidated Copper Co. works one of the world's most productive mines. Pop. 20,000.

Cañar. Central prov. of Ecuador. Lying between the provs. of Chimborazo and Azuay, it has an area of 1,521 sq. m. The chief industries are agriculture and straw hat making. It contains numerous Inca remains. The capital is Azogues. Pop. (est.) 108,000.

Canard (Fr., wild duck). Extravagant rumour or story which flies from one person to another.

Canary. Bird of the finch family (Fringillidae). It is a native of Madeira, the Azores, and the Canary Islands (hence its name), and one of the commonest cage birds in the world, famous for its song. The wild canary, *Serinus canarius*, is 4½ ins. long, olive green mottled with dark brown above, with yellow forehead and underparts. It nests in shrubs among the mountains, and usually rears three broods in a year, but its song does not possess the power or variety displayed by cage birds. The brilliantly coloured cage birds are produced by artificial selection in breeding. The larger breeds may be double the size of the wild bird, and many variations are found.

The canary appears to have been first domesticated in Europe in the 16th century. It breeds freely in captivity; four or five blue eggs are usually laid, and four broods may be raised in a good season.

To keep canaries in good health in captivity they have large cages or aviaries. They are fed on millet and canary seeds, with green food, such as groundsel and chickweed, in moderation—brightness of colour depends on correct diet. The cage should be kept scrupulously clean and regularly supplied with fresh water and dry grit.

The Norwich bird is noted for its fine rich colour and hardy constitution, the Yorkshire is a slender bird with close plumage, and the London Fancy is characterised by black wings and tail. The Scottish Fancy is a large bird with a hump-backed appearance, and the Lancashire Cobby is the largest of all the varieties, with a kind of crown of radiating feathers on its head. The term cobby is used by fanciers to describe crested birds. The rare Lizard canary gets its name from its spotted appearance; the Belgian, which usually fetches a high price, is hump-backed to the verge of deformity.

Roller canaries, chiefly bred in

the Harz Mts., are famed for their sustained and melodious song, the result of prolonged training. The young birds are carefully guarded from hearing the song of any untrained bird, and are kept in the dark, where they listen for hours to the notes of a bird-organ until they have learnt to imitate it.

Canary-breeding is promoted in Britain by societies of fanciers, of which the London and Provincial is the chief. The London cage bird society and the Edinburgh ornithological association also devote themselves largely to the canary. These and other societies hold exhibitions in the winter months, at which from 2,000 to 3,000 birds are shown.

Canary Company. English company of merchants trading with the Canary Islands. It received a charter from Charles II in 1665, and was the shortest lived of all chartered companies, its charter being withdrawn in 1667. See Chartered Company.

Canary Dance. Lively 16th century dance in three- or six-time, also known as canarie dance. It owed its name to the Canary Islands, from which it was introduced to England by way of Spain. It originated in a masquerade in which the dancers were dressed as kings or queens of Morocco, or as savages. The dance is referred to by Shakespeare in *Love's Labour's Lost*—"Canary to it with the feet"—and *All's Well that Ends Well*, and was utilised by Purcell (1658-95) and contemporaries in England.

Canary-grass (*Phalaris canariensis*). Annual grass of the family Gramineae. A native of the countries bordering the Mediterranean, it has flat, lance-shaped leaves, and the flowers are produced in an egg-shaped, spike-like panicle, variegated with green and white. Its flattened yellow fruits are widely used as food for cage birds.

Canary Islands (Span. *Las Canarias*). Archipelago in the Atlantic Ocean forming two provinces of Spain. Some 60 m. off the N.W. coast of Africa, they are of volcanic



Canary. Four typical specimens of this favourite song-bird. Left to right: above, Scottish Fancy and Lizard; below, Norwich and Belgian

origin, mountainous, with cones, craters, beds of tufa, pumice-stone, and solidified lava, and rise to a height of 12,185 ft. in Pico de Teyde or Tenerife. The volcanoes are intermittent, an eruption occurring at Tenerife in 1909. Area 2,800 sq. m.

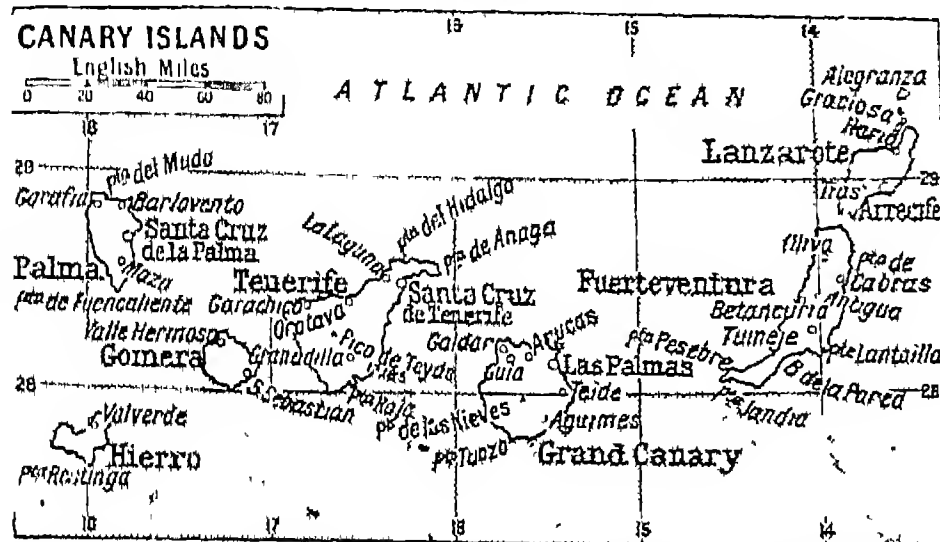
The climate is subject to occasional hurricanes with water-spouts. The flora varies between

that of N. Africa and that of mid-Europe, and includes the date and banana palm, sugarcane, coffee tree, the agave and cactus, the laurel pine, heather, broom, and lichen. Of the 900 species of flowering plants, some 400 are indigenous and 50 common to N. Atlantic islands. The

vine, tobacco, cereals, fruit, and early vegetables are cultivated. The native fauna includes dogs, sheep, and pigs, while cats and

camels have been introduced. Birds are numerous, including visitors from the African coast. Cuttle-fish abound, and seals and whales are seen off the coasts. The few minerals are of little economic value. Agriculture is the chief industry, and the fisheries are also important. The volcanic soil is rich, and where irrigation obtains, land fetches enormous prices, from £100 to £250 per acre being usual. Besides sub-tropical fruits, exports include tobacco and cigars, tomatoes, onions, and immense quantities of bananas, the annual aggregate value of the foreign trade having risen to more than £3,500,000 before the outbreak of the Spanish civil war in 1936. The people are mainly of Spanish descent, with traces of the original inhabitants, the Guanches (*q.v.*), now extinct. Spanish is the only language spoken, and Roman Catholicism the official religion. Education is backward, but improving. There is a small local territorial militia and a Spanish garrison is maintained. The islands lack railways, but have many good roads, and an airport, on Grand Canary.

The chief islands are Grand Canary, Tenerife, Fuerteventura, Lanzarote, Palma, Gomera, and Hierro or Ferro; the chief towns are Santa Cruz de Tenerife, the capital, Las Palmas, Santa Cruz de la Palma, and Orotava. The ports Las Palmas, Santa Cruz de Tenerife, and Arrecife are free, and foreign ships can trade from island to island. The Canaries were known probably to the Phoenicians and certainly to the Romans. Pliny mentions "Canaria, so called from the many dogs (*canes*) of great size," and Nivaria (Tenerife), noted even then for its snow-topped (*nives*, snows), cloud-covered mountains. Visited by Arabs in the 12th century, the islands were rediscovered accidentally by a French ship in 1334, and taken possession of, in 1402, by Jean de Béthencourt, who, after much conflict, relinquished his rights to the Spanish king. One by one the islands were conquered and annexed by the Spaniards (1495), despite attempts by the Portuguese to obtain posses-



Canary Islands. Map of this volcanically formed archipelago, famous for its perfect climate and luxuriant vegetation

sion. Politically connected with Andalusia up to 1833, in that year the Canaries were made a separate province of the kingdom. In 1927 they were divided into the provinces of Las Palmas, with an area of 1,570 sq. m., and a pop. in 1954 of 401,496; and Santa Cruz de Tenerife, area 1,230 sq. m.; pop., 1954, 441,168. Consult *The Canary Islands, their History, Natural History, and Scenery*, D. A. Bannerman, 1922; *Madeira, Canary Islands, and Azores*, A. S. Brown, 13th ed., 1927.

On certain foreign maps longitude is reckoned E. and W. of the meridian of Hierro.

Canary Wine. Still white wine produced in the Canary Islands, also known as Tenerife. It enjoyed a high reputation from Elizabethan times until 1853, when the vineyards were ravaged by phylloxera, and the wine was almost entirely superseded by Madeira. Tenerife produced the finest wines, the best brand, Vidonia, made from the Vidonia grapes, being dry and rich in body and improving with age and in warm climates. The wines of the island of Gomera improved so much with age that old dry Gomera could hardly be distinguished from Madeira. Nowadays,

most Canary wine is made into sherry by vatting with wine made from the Palomino grape. The wine generally known as Canary is a white, sweet, full, heavy wine of the Madeira type. Other so-called Canary wines, white and red, are exported from Spain.

Canary-wood. Coarse kind of mahogany, the timber of *Persea indica*. It is an evergreen tree of the family Lauraceae, and a native of the Canary Islands.

Canberra. City and capital, also federal territory, of the Commonwealth of Australia. The federal territory, area 912 sq. m., is directly under the Commonwealth government, and is surrounded by Murray co., New South Wales. The Molonglo, a tributary of the Murrumbidgee, flows through it.

The city stands on undulating country at an alt. of about 1,900 ft. Several hills, including Mt. Ainslie, 2,762 ft., Black Mt., 2,668 ft., and Red Hill, 2,368 ft., surround the town, while the western skyline is formed by the Brindabella and Bimberi ranges (Mt. Bimberi, 6,274 ft.). The country is open grassland on the plains, lightly timbered, with forest on the mts. The climate is good, with a rainfall averaging 23 ins. In summer day-temperatures are high, but the nights are invariably cool, and relative humidity is low. In winter heavy frosts are commonly followed by clear sunny days.

When the six states of Australia federated in 1901 it was agreed that a new capital should be built on a site to be chosen within New South Wales, but not less than 100 m. from Sydney. The present site was approved by the Commonwealth parliament in 1908, and by the Seat of Government Acceptance Act, 1910, the Australian Capital Territory passed directly



Canary Islands. The little town of Icod, Tenerife, showing the prevailing type of architecture; in the distance is the snow-capped peak of Tenerife



Canberra. 1. National library, in a garden setting. 2. Parliament House, seat of the Commonwealth legislature. 3. Albert Hall, showing also one of the city's wide streets. 4. Civic shopping centre, situated amid spacious lawns

Photos, Australian News and Information Bureau

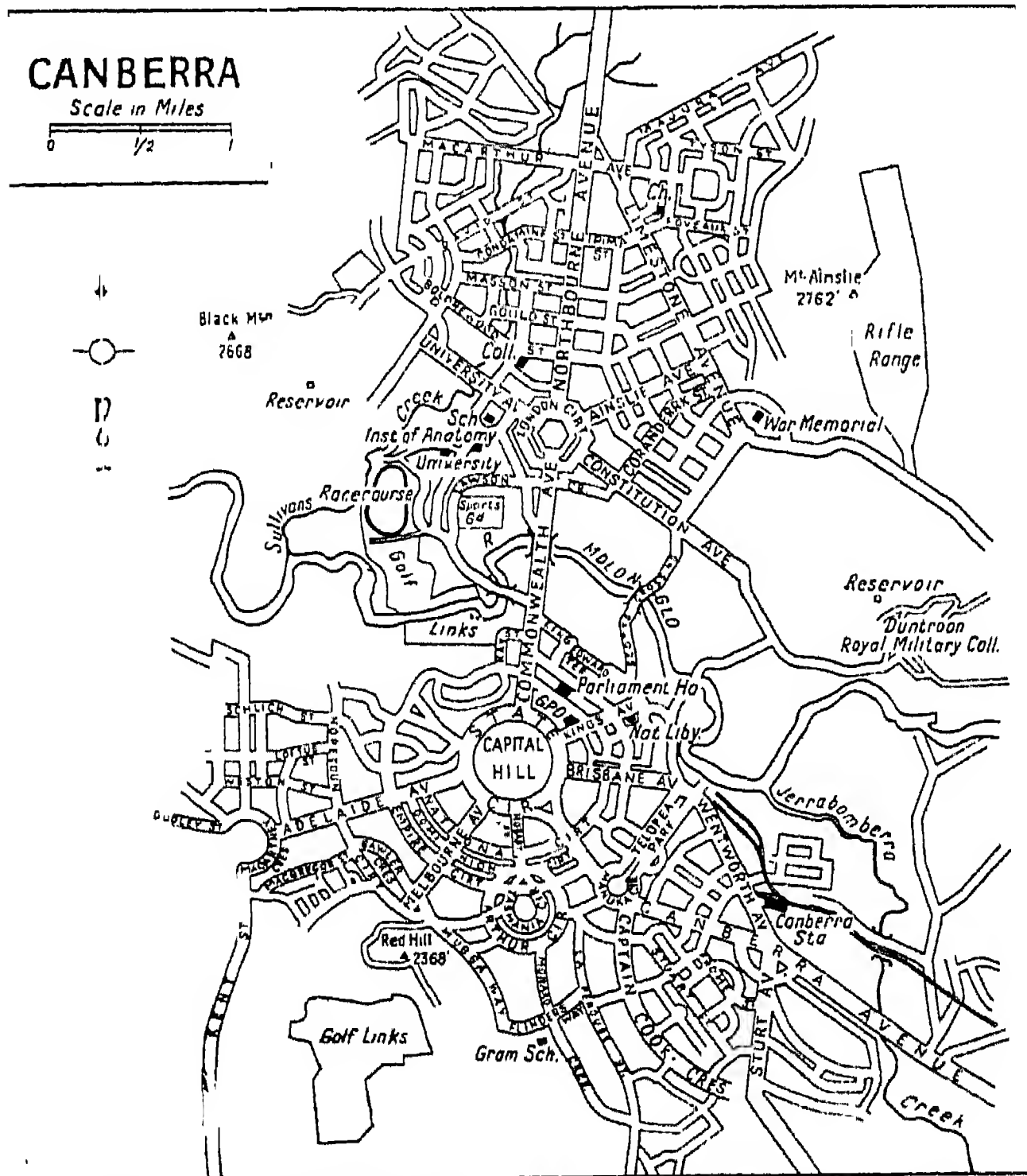
to Commonwealth control. A world-wide competition was conducted for the design of the city, the first prize going to W. B. Griffin of Chicago for a plan intended to separate national from local administration. The in-

augural foundation ceremony took place in 1913. The first sod for the site of Parliament House was turned in 1923, the first sitting of the Commonwealth parliament at Canberra was opened in state by the duke of York (later George VI),

on May 9, 1927. Since that date Canberra has been the centre of the Commonwealth legislature and of national administration. Yarralumla, the residence of the governor-general, is 3 m. from the centre of the city.

Public buildings beside Parliament House include the East and West Block secretariats, the patent office, the national library, the institute of anatomy, and the Australian war memorial. There are primary and secondary schools; the national university is to the W. of City Hill. There are the Australian forestry school and a technical school, while two divisions of the council for scientific and industrial research are located there. The Royal Military college is at Duntroon near the aerodrome. The Commonwealth solar physics observatory and the Yale and Columbia observatory are on Mt. Stromlo.

Good roads have been built, the principal ones being 200 ft. wide, and a feature of the whole city is its garden development. Every street is lined with trees and shrubs, of which several million have been planted. Afforestation programmes have been carried out in the Cotter river area, from which stream the city draws its water supply. Amenities include three shopping areas, tiled swimming pools, tennis courts, and grounds for other sports, cinemas, Y.W.C.A. and Y.M.C.A. halls, hotels, and hostels. Sydney is 202 m. by rail. There are good roads to Melbourne and Sydney



Canberra. Map of the capital city of the Commonwealth of Australia

and air routes to all state capitals. Pop. (1954) 28,227. *Pron.* can-ber'-ra.

Cancale. Fishing port of France, in the dept. of Ille-et-Vilaine, 9 m. E. by N. of S. Malo. The old town stands on a height; the fishing village, which lies at sea level, is noted for its oysters. A British army landed here in 1758 under the 3rd duke of Marlborough. Pop. (1954) 5,463.

Cancan. Parisian dance. It had the character of the quadrille, but was danced with wanton movements and contortions. The word, which originated in a law school dispute of the Middle Ages as to the pronunciation of the Latin *quamquam*, came to be applied to any noisy or scandalous demonstration. In 1830 a French dancer named Mazarié acted the part of a monkey on the stage, and went through a wild dance called the Chahut. This caught the imagination of the grosser people, who copied the dance under the name Cancan, and carried it to such extremes that it was prohibited by the French government. A stage version was popularised in Offenbach's *opéra bouffe* Orpheus in the Underworld, 1858.

Cancer (Lat., crab). In zoology, a genus of crustaceans of the order Decapoda and the sub-order Brachyura, or short-tailed. A typical species is *C. pagurus*, the common edible crab. *See* Crab.

Cancer (Lat., crab). In astronomy, the smallest and least noticeable of the constellations of the Zodiac, between Gemini and Leo. It contains the Praesepe cluster (the Manger), an assemblage of stars just visible to the naked eye as a misty smudge of light. *See* Constellations.

Cancer, TROPIC OF. One of the two parallels of latitude on the terrestrial globe passing through the extreme N. and S. points on the earth's surface at which the sun can be vertically overhead at noon. All points on the earth's surface at which the sun is ever vertical are included between the tropics of Cancer and Capricorn. The tropic N. of the equator is called the Tropic of Cancer, because the sun at the summer solstice, when the earth's rotation carries it over that tropic, enters the sign of Cancer. The S. tropic is that of Capricorn (*q.v.*).

Cancer. Popular term for all types of malignant tumour. The disease is characterised by the unrestrained multiplication of groups of cells in any part of the body. These run amok, invading

and destroying tissues and organs; they consume an enormous amount of energy, leaving none for the host, who becomes weak and thin. At first this multiplication of cells is localised, but soon the cancer cells begin to spread, infiltrating the surrounding tissues. The name cancer (Lat., crab) describes the clawlike way in which the disease grasps masses of tissue. Later the cells find their way into the lymphatics and blood-stream, and may be carried to other and often remote parts of the body where they may lodge, destroying still more tissue and replacing it with clusters of malignant cells.

Cancer may occur at almost any age. In a general sense, the earlier the age, the more rapid and disastrous its course. Most cases occur between 40 and 60 years of age, when the forces of the body begin to fail. Women are attacked rather more commonly than men, but there is no great difference. The organs which may be the primary seat of the disease vary greatly in the two sexes. In men the rectum, colon, prostate, bronchi, and tongue are the most common primary seats of cancer; in women cancer of the rectum, colon, and tongue is relatively infrequent, but cancer of the breast and uterus is common.

Not an Infectious Disease

There is no reason to suppose that cancer is contagious or infectious, and although folk-medicine commands a certain respect, the old wives' tales of cancer houses do not withstand investigation. The occurrence of cancer in husband and wife has been cited as evidence of the spread of the disease from person to person by contagion or infection, but the number of cases occurring in both husband and wife is no larger than would be expected to occur by chance in so common a disease. Belief in cancer houses probably rises from cases where many members of one family have developed cancer of the same organ. Such cases are rare, but a degree of inherited liability to cancer must be accepted, and the frequency of cancer in certain houses is probably due to this fact, if not to mere coincidence.

INCIDENCE OF CANCER. This is stated to be increasing but the statement is difficult to substantiate. The accuracy of modern diagnosis, the increased number of autopsies, and the people who live to the age when cancer becomes more frequent, must be considered. It would seem that

more people now die of cancer because fewer die of other diseases they may have at an earlier stage.

Clinically, this most destructive of all diseases most often attacks silently. Again and again patients are seen with advanced cancer because no pain has called attention to it. Absence of pain and the striking loss of weight, with weakness, may be the outstanding points. Emaciation and weakness result because the new cells seem to require far more energy than the normal cells, and, living like parasites upon the body, they devour its nourishment.

The cause of cancer is unknown. The theory that the disease is due to certain bacteria has been fully investigated, but bacteria have not been isolated from the cancerous or normal tissues of a person with the disease. Another theory is that during the embryonic stage of development of the victim, a period of intensively active growth, a few embryonic cells (under the microscope embryonic cells closely resemble cancer cells) become imprisoned in the growing tissues, retain their character, and are quiescent until some cause stimulates growth at the normal speed. This view becomes less generally accepted.

With the discovery of viruses, great efforts were made to prove that a virus is the cause of cancer, but while certain cancers in some lower animals have been transmitted from animal to animal by cell-free filtrates, the cell-free filtrate of the cancer of man will not transmit the disease. Although the cause of cancer is still unknown conditions predisposing to the disease are recognized, and certain chemicals have produced cancer experimentally in animals.

Chemical Irritants

Chemical causes are also associated with cancer in man, and many of the chemicals, for example, the coal-tar derivatives, are similar in chemical structure to the oestrogens or female sex hormones. These chemicals occur in some forms of soot, and lead to chimney-sweep's cancer, which, through absorption and irritation, occurs most frequently in the groin. They also occur in some forms of oil, and mule-spinners in the cotton industry tend to develop cancers in parts where the skin comes into continual contact with oil.

One of the commonest predisposing causes is long-continued irritation of any part, such as the lips and tongue of heavy smokers,

more especially of clay-pipe smokers. Cancer of the abdomen occurs in the natives of Kashmir following the steady application of heat to the abdomen by the use of an earthenware pot of heated charcoal.

A food factor may be involved. Races that keep to the primitive diet of their forefathers—whole-meal flour, fruits and vegetables often eaten raw, and little or no meat—do not get cancer, nor do European settlers who follow the native customs. Conversely, if the natives adopt the imported European diet they may get the disease. There seems to be some connexion between the rise in sugar consumption in a country and in cancer incidence.

X-RAY TREATMENT. Continual small doses of X-rays may provide the necessary stimulus to cells to lose their control and to proliferate wildly, and so although one of the most potent modern weapons against cancer is X-ray, cancer used to occur frequently in X-ray workers, when the necessity for protection from the rays was imperfectly understood. It was discovered that rapidly multiplying cells are more sensitive to X-rays than are normal tissues, and scientific imagination assumed that a dose which would not affect the normal tissue could kill the rapidly multiplying cancer cells. A sex hormone, stilboestrol, has been known to cause regression of cancer of the prostate.

It was found experimentally in animals that if an animal had a cancer it was impossible by any method to introduce a fresh growth, and so it would seem that some anti-substance to the disease was formed by the host. From this it was hoped that a person who had a cancer removed in the early stages might have a resistance to any new cancer; but some patients develop a new primary growth as long as 10 years after the successful removal of the first.

Any disturbance of bodily function should be investigated at once; any lump in the breast of a woman or any unchecked loss of blood from the genital passages, should always be reported to a

physician. Before the Second Great War this advice was thrown nightly on the cinema screens of Germany. Early diagnosis and complete removal of the growth, with which X-ray treatment may well be combined, are the only hope of cure.

Hilary Ledgerwood, M.B.

Cancer Hospital, ROYAL. London institution for the treatment of cancer. Founded in 1851, its first home was in Hollywood Road, West Brompton, which accommodated 20 patients, while it had a department for out-patients at 1, Cannon Row, Westminster. In 1861 the present building in Fulham Road was opened. It was enlarged in 1883 to accommodate over 100 patients. The hospital is fully equipped with modern apparatus for the diagnosis and treatment of all forms of cancer and allied diseases. Methods of treatment include surgical and radiotherapeutic, with high and low voltage X-rays, and all forms of radium. Chemotherapy in certain forms of cancer is investigated. Associated with the hospital is the Chester Beatty research institute. The hospital is a teaching school of the university of London.

Cancer Research Fund, IMPERIAL. Society formed to combat cancer. The Imperial Cancer Research Fund was founded in 1902 under the direction of the Royal College of Physicians of London, and the Royal College of Surgeons of England, and was incorporated by royal charter in 1939. Its objects

are to promote investigations into the causes, prevention, and treatment of cancer and malignant diseases, by providing and maintaining laboratories for re-

search, assisting cancer research in hospitals and institutions, and generally to undertake systematic investigations into this disease. The fund publishes an annual report, and its staff contribute to journals on numerous cancer problems and give lectures in the Royal College of Surgeons. These have been invaluable to the medical profession. There are two blocks of laboratories, at Mill Hill and at Lincoln's Inn Fields. The offices are at the Royal College of Surgeons, Lincoln's Inn Fields London, W.C.2.

Cancrizans (Lat. *cancer*, a crab). Musical term used when a theme is repeated backwards, note for note, as in a crab-wise motion.

Candaba. Town of Luzon. Philippine Islands, on the river Pampanga, 13 m. N.E. of Bacolod. It has weaving mills, and fisheries in Lake Candaba.

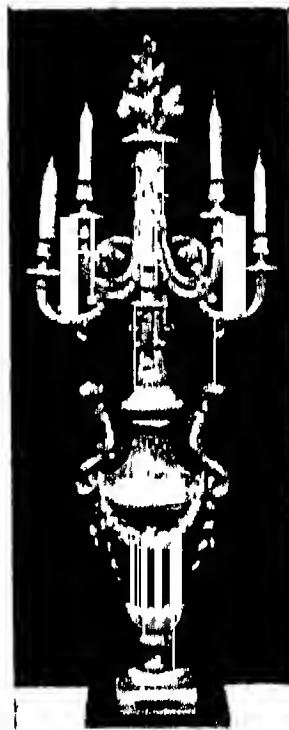
Candace (Gr. *Kandakē*). Official name of ancient Ethiopian queens. Their wealth, implied in Acts 8, is exemplified by jewelry finds. The Candace Amentari invaded Egypt, but was repulsed by Augustus's prefect Petronius, 23 B.C. *Pron.* Canda-see.

Candelabrum (Latin). Large candlestick or lamp-stand with arms, placed either on floor or table. The former was usually pillar-shaped, and from 4 ft. to 9 ft. or 10 ft. high; the latter was not remarkable for its height, but bore branches on each side for candles or lamps, which were sometimes fed from a small trough or tank of oil supported on the top

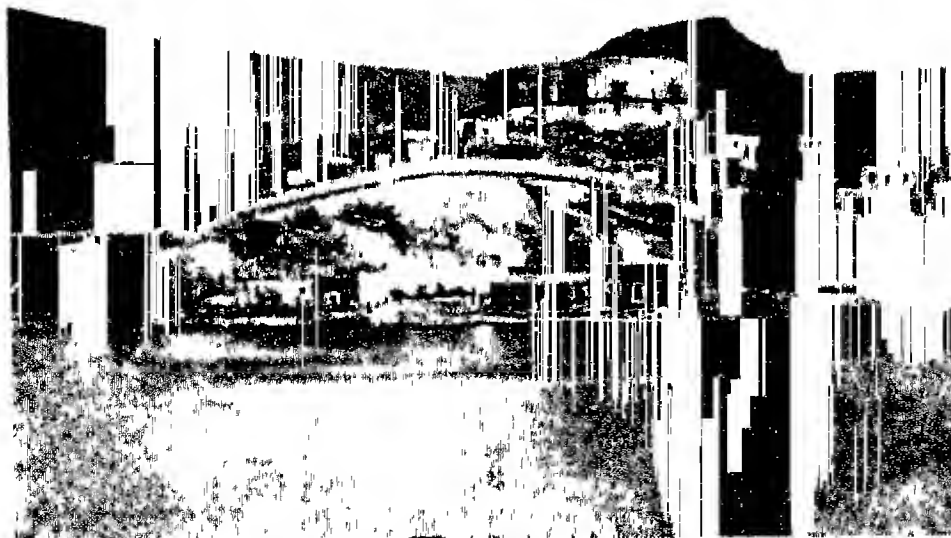
of the central upright. Among the ancient Romans it was elaborately carved and often adorned with jewels and cameos.

Candelilla Wax. Name given to a deposit that occurs as a coating on the twigs and leaves of the Mexican candelilla shrub. The yellowish-grey to dark-brown wax is separated by steam or solvents and when refined is used for polishes, varnishes, etc.

Candia (Greek *Megalokastro* or *Heraklion*). Largest city and former capital of Crete. It is situated on the N. coast, has a small, silted harbour, and exports oil, soap, almonds, wine, dried grapes, and cocoons. The ruins of Cnossus, centre of pre-Hellenic civilization, are 3 m. S.E. Founded about 824 by Saracens, it was taken and fortified by the Genoese in the



Candelabrum.
Louis XVI ex-
ample in ormolu



Candia. The old fort built by the Venetians and defended by Morosini during a siege by the Turks in 1669

12th century, and afterwards by the Venetians, who built the city walls, arsenal, and a cathedral. The cathedral was demolished in the late 19th century, and a new Greek cathedral consecrated in 1893. Candia was besieged and taken by the Turks, 1667-69; suffered from earthquake in 1856, and from bombardment by the Powers in 1897. Pop. (1951) 51,144.

In the Second Great War the battle of Crete (*q.v.*) began on May 20, 1941, when German paratroopers were dropped around and in Candia; some 2,000 were killed or captured by the Allied forces there before these (except the severely wounded) were evacuated by sea on the night of May 28-29. The aerodrome was bombed repeatedly by the Allied air forces. Candia was liberated by Cretan guerrillas in Nov. 1944.

Candida. Play by Bernard Shaw. Described as "a vindica-

lish translation, "par E. De Volt . . ." appeared in London the same year, but that published by Nourse, London (1759), first bore Voltaire's full name as author. The story, marked throughout with a penetrating wit and much indecency, was a satire on the Leibnizian theory that all is for the best in the best of all possible worlds.

Candied Fruits. Fruit stoned and boiled in white sugar, so that it is impregnated and coated with it. Plums, cherries, apricots, and peaches are mostly used. The rind of oranges, lemons, and citron boiled in the same way is known as candied peel, and forms an ingredient in cakes and puddings.

Candle. Cylinder of fat or wax surrounding a fibrous core or wick, used for illumination in the absence of other sources. The earliest form of candle was the torch of resinous wood and its modifications such as the link and flambeau,

consisting of rope saturated with pitch and resin, and sometimes coated with beeswax. Dip candles with rush or loosely-twisted cotton wicks were in general use throughout the Middle Ages, and

"snuffing," were first used. Modern candles are made almost wholly of paraffin wax, obtained from crude petroleum in the process of refining. They give a greater intensity of light than any other form of candle previously used. The softer grades of paraffin wax from American sources are sometimes mixed with stearine, which acts as a stiffener for candles required for warm climates, but such admixture is unnecessary with high grade wax produced in the East.

The modern candle-making machine contains upwards of 500 moulds, usually of almost pure tin, which are enclosed in a sealed tank through which water for cooling purposes is circulated. Each mould contains a movable piston at the lower end through which the wick passes up the centre of the mould. The piston imparts the shape to the tip of the candle. The candles when ready are ejected from the moulds by raising the pistons. Self-fitting ends on candles are formed by inserting a shaped cap piece in the top of the mould. Decorative candles are moulded in a variety of shapes and sizes, some of which require the use of a two-piece mould, or manipulation in a lathe. For colouring these, wax soluble dyes which do not affect the burning, and are reasonably fast to light, are generally used.

For ecclesiastical candles, beeswax has always been used; certain candles for R.C. churches have to contain a definite percentage of beeswax. They are formed by pouring the melted wax down the suspended wicks until a sufficient thickness is obtained, the candle then being put on a marble slab and rolled into shape.



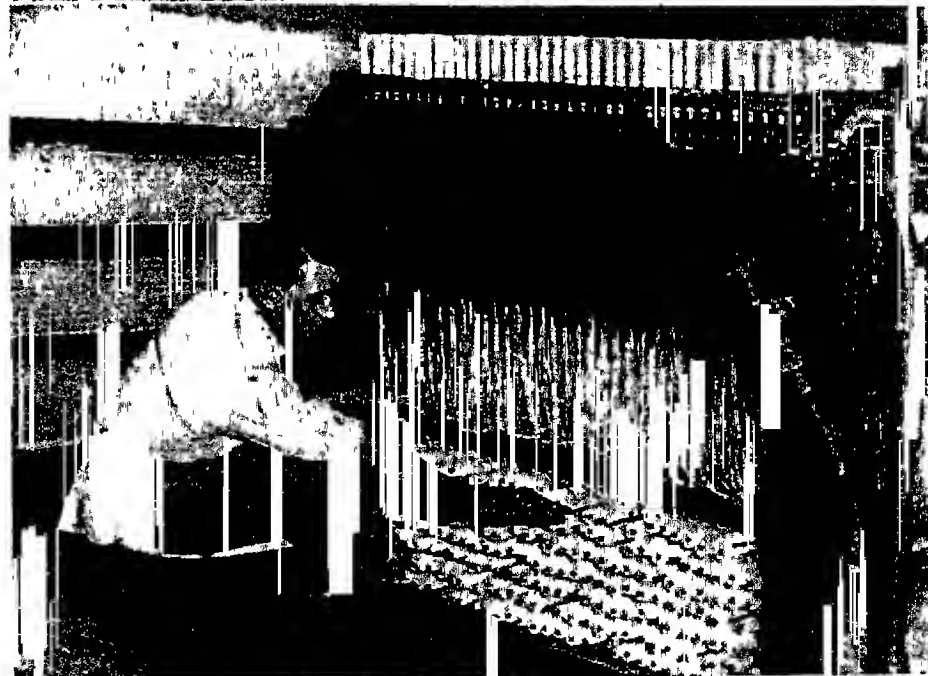
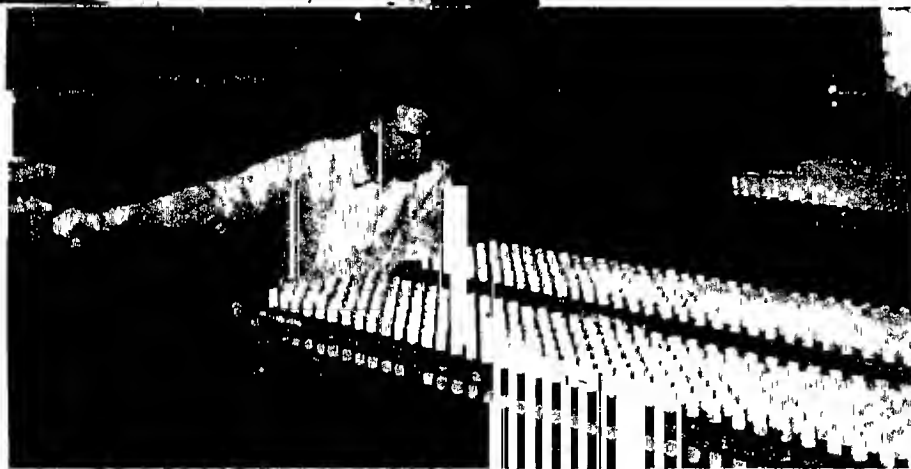
tion of the woman in the home," this comedy was written in 1894 and achieved success in Germany before its production at the Strand Theatre, London, July 1, 1900, when Janet Achurch appeared in the title rôle. Notable revivals included those at the Everyman, 1923; Globe, 1937; Westminster, 1939.

Candidate (Latin *candidatus*, white-robed). One seeking election to any office or appointment. In the United Kingdom the name is specially applied to those who seek election to the house of commons and other public bodies, also to candidates for a headmastership, for a fellowship, for clerical positions, etc. At Rome applicants for office were a toga whitened by fulling—hence their name. See Election; Vote.

Candide. Philosophical novellette by Voltaire. It was published at Geneva, 1759, and purported to be translated from the German of Dr. Ralph. An Eng-

were made by dipping the wicks in melted tallow.

The art of moulding candles was introduced in the 15th century, but it was not until stearine (stearic acid) candles made their first appearance about 1840 that the process of moulding became general. About the same period plaited cotton wicks, which did away with the necessity for



Candle. Stages in the process of making wax candles. Top, scraping off surplus wax from the trough above the moulds. Centre, ejecting candles from the moulds. Bottom, continuous wicking arrangement beneath the moulds

Courtesy of Price's Patent Candle Co., Ltd.



Candle. Fitting moulded wax night lights into their paper cases
Price's Patent Candle Co., Ltd

The wicks of all candles are soaked in solutions, usually ammonium salts or borax, in order to regulate the curve of the wick, and prevent its burning away too readily.

Tapers are made by passing long lengths of cotton yarn from one drum to another through a bath of molten wax and through dies until the required thickness and finish are obtained. They are then cut into lengths and one end is feathered. Night lights are moulded in a similar manner to candles, but the wick is inserted after moulding. The softer grades of paraffin wax are used for night lights so that the small flame will melt the whole of the wax material. They are made to burn either in paper cases or on a glass holder. The paper is often fire-proofed to dispense with the need for water. See Lighting.

Bibliography. Modern Soaps, Candles, and Glycerine, L. L. Lamborn, 1906; The Science of Petroleum, vol. iv D. Allan, 1938; The Story of the Lamp, F. W. Robins, 1939.

Candlemas. Christian festival commemorating (Feb. 2) in the R.C. Church the Purification of the Virgin Mary, and in the Eastern Churches the Presentation of Christ in the Temple. The Anglican Prayer Book retains both commemorations. First observed at Jerusalem, as the 40th day after Epiphany, the ancient Christmas, and still kept by the Armenians on Feb. 14, when the sacred fire is kindled, it has been generally kept on Feb. 2 since the 7th century.

The name Candlemas dates from the 11th century, when the ceremony of blessing candles and carrying them in procession was instituted. It symbolises the entry of Christ, the Light of the World, into the Temple (Luke 2); and was abolished in the Church of England

in 1854. In Scotland Candlemas is the first quarter day of the year.

Candle-nut. Fruit of *Aleurites moluccana*, a tree belonging to the family Euphorbiaceae, a native of the Moluccas and the islands of the S. Pacific. The fruit is round and fleshy, of an olive tint, with two seeds like small walnuts with hard outer shell, and containing a large amount of valuable oil. In some islands, stuck on reeds, the nuts are used as candles, hence the English name. The oil is used in the producing countries for illumination, either as a constituent of candles or as lamp oil. It may be used as a drying agent in paints and in soap-making.

Candle-power. Measure of luminous intensity. Some measurement of the efficacy of different sources of light was first called for in the middle of the 19th century when, in the days before gas mantles, it became necessary to keep a check on the "illuminating power" of gas sold to the public. The first unit used was the "standard candle," defined in the Metropolitan Gas Act of 1860 as the intensity in a horizontal direction of a spermaceti candle weighing $\frac{1}{4}$ lb. and burning 120 grains per hour. This, however, proved so variable that in 1898 the standard candle was replaced in England by a specially constructed lamp using air saturated with pentane vapour. This Harcourt pentane lamp gave a flame equivalent to 10 standard candles. The French Carcel lamp was a similar device burning colza oil; the German Hefner lamp burned amyl acetate.

Meanwhile, the invention of electric light suggested a more reliable standard; and in 1909 an agreement was reached to standardise the unit of candle-power used in Great Britain, France, and the U.S.A. by means of specially made carbon-filament lamps, which were frequently exchanged among the three national laboratories. The resulting "international candle," though reasonably reliable in itself, led to discrepancies in comparing the light from carbon filaments (which is fairly sharply confined to certain wavelengths) with light from other sources, particularly if this was a different colour. In 1946, therefore, the International Committee of Weights and Measures agreed on a new primary standard. The radiating material was a small tube of thorium (the stuff of which gas mantles are made) immersed in liquid platinum on the point of

solidification (1773° C.). This gives virtually black-body radiation of much the same colour as carbon filament lamps; and the intensity was found to be 58.9 candles per sq. cm. It was therefore decided to alter the unit slightly, so that the new standard would give 60 "new candles" (or candelas) per c.c.

Candle-tree (*Parmentiera cerifera*). Tree belonging to the family Bignoniaceae. It is a native of Panama, where, in the Chagres Valley, it forms forests. It has trefoil leaves and large greenish-white bell-shaped flowers, succeeded by cylindrical waxy-looking fruits from 2 ft. long, resembling large candles. They contain a large quantity of oil and are used as cattle food. The cucumber-like fruits of the allied species, *P. edulis*, are eaten in Mexico.

Candolle, Augustin Pyramus de (1778-1841). Swiss botanist.



De Candolle

Born at Geneva, Feb. 4, 1778, he settled in Paris in 1796 where Cuvier and Lamarck entrusted him with the preparation of the 3rd ed. of *Flore Française*, the introduction to which contains the first exposition of his principle of natural classification of plants. He lectured in botany at Montpellier 1807-16 and during 1807-13 made a botanical survey of France. Returning to Geneva in 1816, he worked on his system of classification, embodied in *Regni vegetabilis Systema Naturale*, of which only two volumes were completed. He died at Geneva, Sept. 9, 1841.

Candytuft (*Iberis*). Genus of herbs and sub-shrubs of the family Cruciferae. Natives of S. Europe and W. Asia, they have smooth, round stems and alternate narrow leaves. The white or purple flowers are produced in flat clusters (corymbs), and the outer two



Candytuft,
Iberis umbellata

of the four petals are larger than the others. One species (*Iberis amara*), with minute white flowers, occurs wild on dry soil in cultivated ground, in the S. and E. of England. Several species are in general cultivation as garden

flowers, including the annual rocket candytuft (*I. coronaria*) with long close heads or spikes of white flowers; the common candytuft (*I. umbellata*), also an annual, with flatter heads of purple or flesh-coloured flowers; and the shrubby evergreen candytuft (*I. sempervirens*). The name is derived from Candia.

Cane (Lat. *canna*). Commercial name for the stems of various grasses and palms. The more important are bamboo (*Bambusa arundinacea*), rattan (*Calamus rotang*, etc.), malacca (*Calamus scipionum*), sugar (*Saccharum officinarum*). The first and last of these are grasses, the others palms. See Bamboo; Rattan; Sugar.

Canea OR KHANIA. Seaport and capital of Crete. Occupying the site of the ancient Cydonia, on the N. coast of the island, it is surrounded by old Venetian walls and



Canea, Crete. General view of the city and harbour from the sea

a deep ditch. It has Turkish mosques, Greek churches, a synagogue, and relics of Venetian occupation. A short distance E. is a modern European quarter containing the residences of the high commissioner and foreign consuls. The harbour is large, but shallow, the finest harbour on the island, Suda Bay, lying to the E. of the town. Canea has foundries, printing works, and soap, oil, and wax factories. Founded by Venetians in the middle of the 13th century, it was captured by the Turks in 1669. German parachutists landed near Canea, which was defended by British and Greek troops, on May 20, 1941. It was almost destroyed by German bombing on May 25, and fell to the Germans on May 27. Pop. (1951) 33,211.

Canea gives its name to a nome (province) of Crete. Pop. (1951) 126,524.

Canella. Bark of a small evergreen tree (*Canella alba*), member of the family Canellaceae. It is a native of the West Indies. The whole tree has an aromatic fragrance, and when in flower perfumes a considerable area around

it. The pale orange-coloured bark, sometimes called wild cinnamon, is used as a tonic, and by the negroes as a spice.

Canelones. Department of Uruguay. It is bounded N. by the dept. of Florida, and S. by Montevideo and the Atlantic coast. After Montevideo it is the most populated and the most important agricultural dept. in the republic. Cattle-breeding is the most important industry. The rivers Colorado and Las Piedras water the soil, which produces vines and cereals. The capital is Canelones. Area, 1,834 sq. m. Pop. 200,308.

Cane Sugar. Term popularly applied to sugar manufactured from sugar cane, as distinguished from that made from the root of the sugar beet. More strictly it is the sugar found in the juice of many grasses, in the sap of certain trees, and in some roots such as

that of the beet. The chief constituent of cane sugar, beet sugar, maple sugar, palm sugar, etc., is the chemical substance sucrose or saccharose, which is distinguished from other sugars, e.g. glucose, fructose, lactose, maltose, by physical and chemical properties. See Sugar.

Canes Venatici (Lat., the Hunting Dogs). A constellation named by Hevelius. It is to be found S. of the three stars which form the handle of the Plough, and its brightest star is Cor Caroli (the heart of Charles), a peculiar double star, so named by Halley because it glowed its brightest when Charles II was about to re-enter London at the Restoration.

Cang OR CANGUE (Port. *canga*, yoke; Chinese *Kea*). European name for a Chinese instrument of punishment of minor offenders. It consists of a large heavy slab of wood made to grip the neck. Thus pilloried, the culprit can neither lie down nor reach his mouth, and is compelled to stand in the streets, dependent on passers-by for food, until his term of punishment expires. His name and offence appear on the cang.

Cangas de Onis. A town of Spain, in the prov. of Oviedo. It stands on the river Sella, here crossed by a 12th century bridge, 35 m. E. of Oviedo. It trades in cattle and coal. Founded in the 8th century by Pelayo, who gained a victory over the Moors in the vicinity, it retains evidences of Roman occupation. Near by is the cave of Covadonga, in which Pelayo, an 8th century Asturian king, sought refuge after his defeat on the Guadalete.

Cangas de Tineo. A town of Spain, in the prov. of Oviedo. In a fertile dist., 35 m. S.W. of Oviedo, it trades in farm produce and has factories for linen, woollen, and leather goods. Pop. 23,000.

Cango. Region of the Cape Province, S. Africa, 18 m. N. of Oudtshoorn. It is remarkable for its limestone caves, discovered in 1780. The chief products are lucerne and ostrich feathers.

Canicatti. A town of Sicily. In the prov. of Agrigento, it is on the Naro river, 23 m. by rly. N.E. of Agrigento. The district produces grain, almonds and olives, and has sulphur mines. Pop. (1951) 30,072.

Canidae. Family of the carnivora (flesh-eating mammals), including dogs, wolves, foxes, and jackals. They are placed by zoologists between cats and hyaenas on the one hand and bears and weasels on the other. In their wild state the dog family may be distinguished from other carnivora by having long and pointed muzzles, long tails, and digitigrade feet provided with blunt and non-retractile claws. The ears are always erect and pointed, and the hind feet have four toes. All, with the exception of the African hunting dog, are of sombre and uniform colouring, being either grey or brown, tending to reddish in some of the foxes. All live in burrows, clefts of rocks, or hollow trees; and all are nocturnal in their habits. Most are gregarious, and hunt their prey in packs, especially in winter. In most cases they track their prey by scent. The dog family is spread over nearly the whole world; and most species can be domesticated. See Dog; Fox; Wolf.

Canigou. Peak of the Pyrenees. In France, it is 24 m. S.W. of Perpignan. Its height is 9,140 ft., and it has manganese mines.

Canis. Name of two constellations, Canis major (the greater dog) and Canis minor (the lesser dog). Canis major lies low on the horizon for English observers, but includes Sirius, brightest of all fixed stars. Sirius lies on the pro-

longation towards the S. of Orion's belt, and forms the vertex of an inverted triangle of which the base joins Betelgeuse to Procyon, the brightest star in Canis minor.

Canker (Lat. *cancer*, crab). Disease affecting trees. Canker of the apple and pear, producing deformity and slow decay, is caused by a fungus (*Nectria*), the spores finding entrance in broken branches and shoots or in parts damaged by American Blight. Old cankered trees may live for years but the effect of canker on young trees is serious. Trees in ill-drained land are most susceptible. Lack of potash is a predisposing cause: an annual application of sulphate of potash to the soil, in March, is advised. Cankerwood, which is recognized by distorted and roughened bark, must be cut out and burnt. Larch plantations have been wiped out by the canker caused by the fungus *Dasyscypha calycina*.

Canker. Disease of the ear, common among dogs and less frequent in the domestic cat. Though ulcer of the flap of the ear is frequently described as canker, the word really applies to an ulcerated condition of the inner lining. It may be caused by wax or dirt, or by parasites of the mite type. An ointment consisting of one part of nitrate of mercury to 20 parts of lard worked carefully into the ear will destroy these mites, while zinc ointment will cure the sores.

Canna (Lat., a reed). Large genus of perennial herbs belonging to the family Cannaceae. They



Canna indica, or Indian shot plant

possess ornamental foliage and showy flowers. The true petals are green and leaf-like, while what appear to be three brightly coloured petals are really the stamens, only one of which produces an anther. The tubers of some species are used as food, and from those of *C. edulis*, a Peruvian species cultivated in the West Indies, a kind of arrowroot called *Tous les mois* is prepared. Cannas are best known, however, as hothouse plants, used for summer bedding plants out of doors; and under cultivation many hybrid forms have been produced. They are sometimes known as Indian Shot, from the hard, round, black seeds, which have been used as a substitute for coffee-beans.

Canna. Island of the Hebrides, Inverness-shire, Scotland. Situated 12 m. S.W. of Skye, it is $4\frac{1}{2}$ m. long by 1 m. broad, and has an area of $4\frac{1}{2}$ sq. m. It has a small but secure harbour, from which an active fishing industry is carried on.

Cannabis (Greek *Kannabis*). A small genus of the family Cannabinaceae, and the name used



Cannabis sativa, or hemp

by Dioscorides for the hemp plant. The hemp (*Cannabis sativa*), which is native to central and western Asia, is cultivated almost throughout the world, in colder countries for its seeds and fibres, in the tropics for the resin which exudes from it. It is an annual herb, whose height varies from 4 to 15 ft., and its large leaves, divided into from five to seven long leaflets, give it a handsome appearance.

The small, greenish flowers are produced in sprays and spikes from the upper part of the stem, the females on separate plants from the males; and the fruits are the well-known little greyish nuts, each containing an oily seed. Hemp seed is used as a poultry food and for extracting its oil, used in painting, soap-making, etc. The fibre is an important textile, and the resin yields a valuable medicine—cannabinol. It also forms the eastern intoxicant hashish. Dried leaves are smoked as bhang (*q.v.*).

Cannabis Indica. Dried flowering or fruiting tops of the female plant of *Cannabis sativa*, or Indian hemp. An extract (dose $\frac{1}{2}$ gr. to 1 gr.) and a tincture (dose 5 to 15 minims) was formerly used in medicine. *Cannabis indica* produces a condition of mild intoxication, the individual feeling gay and happy, and laughing or smiling. In medicine *Cannabis indica* is used to relieve migraine and neuralgia.

Cannae, BATTLE OF. Fought Aug. 2, 216 B.C., near the village of the same name in Apulia, Italy, between some 80,000 Romans and a Carthaginian army of about 40,000 under Hannibal. By skilful tactics Hannibal completely defeated the Romans under the consuls Gaius Terentius Varro and Lucius Aemilius Paulus, the latter being killed. The battle of Cannae was one of the greatest disasters that befell the Roman arms. The site is near the mouth of the Ofanto, $1\frac{1}{2}$ m. from Canosa.

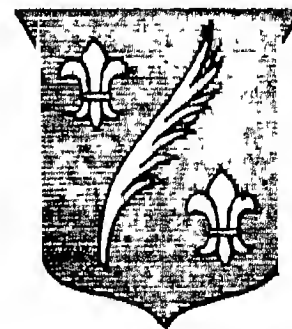
Cannan, EDWIN (1861–1935). British economist. He was educated at Clifton and Balliol College, Oxford. He was lecturer in political economy at London university, 1897–1926, and professor for the last 20 years. He retired in 1927 and died April 8, 1935. His books included *History of the Theories of Production and Distribution*, 1893; *Wealth*, 1914; *Money*, 1918; *Modern Currency*, 1931. His authoritative editions of Adam Smith, clarifying Smith's theory of supply and demand, became standard works, and, with his study of money, were Cannan's chief contribution to economic thought.

Cannanore OR KANANUR. Town of India, in Kerala state, 49 m. N.W. of Calicut. Vasco da Gama touched here in 1498, and in 1501 the Portuguese set up a factory, building a fort in 1505. The Dutch seized Cannanore in 1656; the British took it in 1783. It declined in importance after the middle of the 19th century. Cotton textiles are made; coir, copra, pepper, and cotton fabrics are exported. Pop. (1951) 42,431.

Canned Foods. See Canning.

Cannel Coal. Type of coal which falls within the lignitious and bituminous species of coal but is characterised by an abnormally high hydrogen content—6 p.c. to 8 p.c. on the dry ash-free basis. Volatile content exceeds 40 p.c. and cannel coals burn with a long flare. They probably originated in deposits of the lower forms of plant life, *e.g.* algae and mosses.

Cannes. Town and holiday resort of France, in the dept. of Alpes - Maritimes. Protected by



Arms of Cannes

hills on the N., it lies 120 m. E. of Marseilles, and overlooks the Mediterranean. Its equable climate and beautiful surroundings have made it a popular resort both in the summer and the winter. The rise to favour of Cannes dates from the completion of the railway there in 1864. A carnival and regatta and an international film festival are held annually. Overlooking the coast is a fine promenade. Fruits and flowers grow in great abundance. Cannes was occupied by the Germans in 1942. Just E. of the Allied landing zone in Aug., 1944, it was liberated by American troops Aug. 24.

Lord Brougham, who is buried here, did much to make Cannes

known to English people, for whom several English churches were built. Old buildings include remains of the castle, the church of Notre Dame, and a tower, all in the quarter called Le Suquet on Mont Chevalier. Two miles inland is Le Cannet, with two towers, also a winter resort. The hill of La Californie, whereon is an observatory, is said to afford the finest view on the Riviera. The Îles de Lérins (*q.v.*) lie off Cannes. Pop. (1954) 50,192. *Pron.* can.

Cannibalism. Practice of eating human flesh. The Spanish word *Canibales*, a 17th-century variant of the name of the man-eating Caribs, has passed into general use as a synonym for anthropophagi. That primeval man derived the use of animal food from his pre-human ancestry is a reasonable inference; many of the bones of one of the earliest forms of man, *Pithecanthropus pekinensis*, had been broken or crushed so that the marrow could be obtained from the long bones and the brains from the skulls. That human flesh was occasionally included in the dietary at a later stage is deduced from the charred, split, and scraped human bones in Palaeolithic sites (Belgium, Croatia, France) and in Neolithic caves (Karlsö, Sweden). That hunger was not the sole motive is inferred from the necklets of human teeth, neolithic skull drinking-cups, and other evidence (Egypt, Spain, Scotland). Cannibalism in Classical times is recorded by Herodotus and others who describe peoples such as the Scythian Massagatae, nomads to the N.E. of the Caspian who killed and ate old people.

Cannibalism has been classified into two main types. Endocannibalism refers to the practice in which are eaten the bodies of kin and members of the same tribe as the consumer; this was notable among some tribes of W. and S.E. Australia, and in S. America. An attenuated form was found among some peoples of Brazil who cremated their dead, and subsequently ingested the ashes. In exocannibalism, which seems to have been more widespread, individuals outside the tribe were eaten—*e.g.* enemies killed in war (among the Algonquin and Iroquois), slaves (Bondjio), or selected sacrificial victims (ancient Mexico). In some societies, all took part in the practice (New Guinea), in others a selected few priests or chiefs (Maori, New Zealand; Kimbunda, W. Africa); in some it was sporadic (Tierra del



Cannes, French Riviera. View of the promenade, La Croisette, looking towards the old quarter of the town. In the distance are the Estérel hills

Fuego), in others frequent (Mangbetu, central Africa).

The "cannibal zone" of central Africa at the middle of the 19th century extended almost coterminously with the equatorial forest, with outlying areas in Dar Fertit, Gallaland Angola, and in the S.E. In S.E. Asia the practice was frequently associated with headhunting, especially in Malaysia and Indonesia; the Dyaks of Borneo, Tolalaki of Celebes, Italonos and Efugaos of the Philippine Islands were notorious. In Oceania, cannibalism occurred more frequently among the Melanesians than it did in Polynesia. Various tribes of aborigines in Australia consumed human flesh in different degrees, the Theddora and Ngarigo preferring the hands and feet of the slain, the Kamilaroi eating the liver and heart. Cannibalism was more prevalent in S. America than in N., where it survived mainly as a ceremonial rite, for example in the N.W. and in Mexico, while the Sioux consumed the powdered heart of a brave enemy, and the Nauras of New Granada ate the hearts of the Spanish invaders.

Biological necessity is a clearly discernible cause of cannibalism. In times of famine, when total food intake was so low that survival could be attained only by eating the less useful members of a community, cannibalism occurred among many peoples. Darwin reported the consumption of their old women by tribes of Tierra del Fuego; Eskimo have done the same as a last resort. Less obvious than its use to remedy deficiencies in total food intake is the occurrence of cannibalism as an unconscious endeavour to rectify protein

deficiency. Its fairly high frequency among sedentary and agricultural peoples of the equatorial forests whose supply of animal protein was low contrasts markedly with its absence among hunting peoples of the same regions. The Azande diet, for example, is today characterised by almost complete absence of animal protein, and a dangerously low fat/carbohydrate ratio; their cannibalism undoubtedly met a biological need in maintaining an adequate diet.

Cannibalism also provided a useful means of disposing of the dead. In S. America many tribes considered it preferable to be eaten by their friends than to be eaten by worms. In some Australian tribes a man could eat his dead wife but not his sister on account of totemic beliefs.

Possibly the most widespread ideas underlying cannibalism were associated with its magical functions. To obtain the qualities of a dead man, the obvious course is to eat him or those parts of him in which the quality is thought to reside. The Basutos ate the heart of a valiant enemy; Dyaks ate the palms of the hands and flesh of the knees of their victims to strengthen their own hands and knees. A man when he is eaten becomes part of the eater. Hence consumption of a victim would prevent revenge by his kin since any hurt inflicted in vengeance would also harm a kinsman. Consult The Golden Bough, Sir James Frazer, various editions; Headhunters, Black, White, and Brown, A. C. Haddon, 1901.

Canning. Method of preserving fresh foods by sterilising them in hermetically-sealed containers. No added substance or chemical is

required, and the heat need only be sufficient to kill the bacteria which cause fermentation and decay. Foodstuffs were first canned in 1810 by Appert, a French chef, and although methods of canning have changed, and the whole process has become largely automatic, his general principle is that followed in canning today. Appert placed the food in a metal glass-lined container which was then surrounded by boiling water until it was cooked; the container was then tightly stoppered. Appert was under the belief that the preservation of the food was entirely due to the exclusion of the air; but as Pasteur first discovered, the real cause of preservation was that the heat of cooking destroyed the germs of putrefaction.

Modern Canning Processes

In a modern cannery, the meat, vegetable, fruit, or other food is packed in cans, generally made of thin steel with a coating of tin. Lids are fixed on the tins by automatic machines which turn down and seal them at the rate of 30 tins a minute. The sealing is done at a stage when the temperature attained has a "sterilizing" action and prevents the presence of germs which might cause putrefaction; any further danger is avoided by the close seal of the lid to the body of the can, blocking the entrance of air. In another process a small round hole is left in the centre of the lid of each can, so that the air and gases generated by the cooking of the material are allowed to

escape. The cans are placed in steam ovens holding up to 500 tins at a time, and the steam is turned on until the temperature reaches 270° F. The cans remain in these retorts long enough for the germs and spores to be destroyed, when they are taken out and the small holes in the lid sealed with solder while the contents of the tins are still very hot, so preventing any living germ gaining access. The cans may then be returned to the retorts for a further period of cooking, in order that their contents may be completely sterilised. In some canneries, the food is cooked by immersing the cans in a vat partially filled with a solution of calcium chloride and water. Immediately after their contents have been cooked, the cans are rapidly and artificially cooled, as over-cooking has a tendency to impair the quality of the product.

Cans intended to contain fruit are varnished inside with various resistant lacquers to counteract the effects of the acids, while cans for certain other foodstuffs are lined with specially prepared paper.

Fruits and vegetables should be canned as soon as possible after picking, and the canneries are usually sited in the areas growing the particular products they deal with. In Great Britain the principal vegetable canneries are in Lincolnshire and Herefordshire, while the fruit canneries are mainly at Evesham and in Kent. Australia

cans vast quantities of sub-tropical fruit, and the New Zealand canneries specialise in boiled and corned beef and mutton. The greater part of the product of Canadian canning factories consists of fish, meat, and meat products. Spain and Portugal specialise in the canning of salmon and sardines. South Africa, besides canning large quantities of fruit, has a number of factories devoted to the canning of crayfish and lobsters.

Milk was first canned in 1856, sugar being used as an added pre-

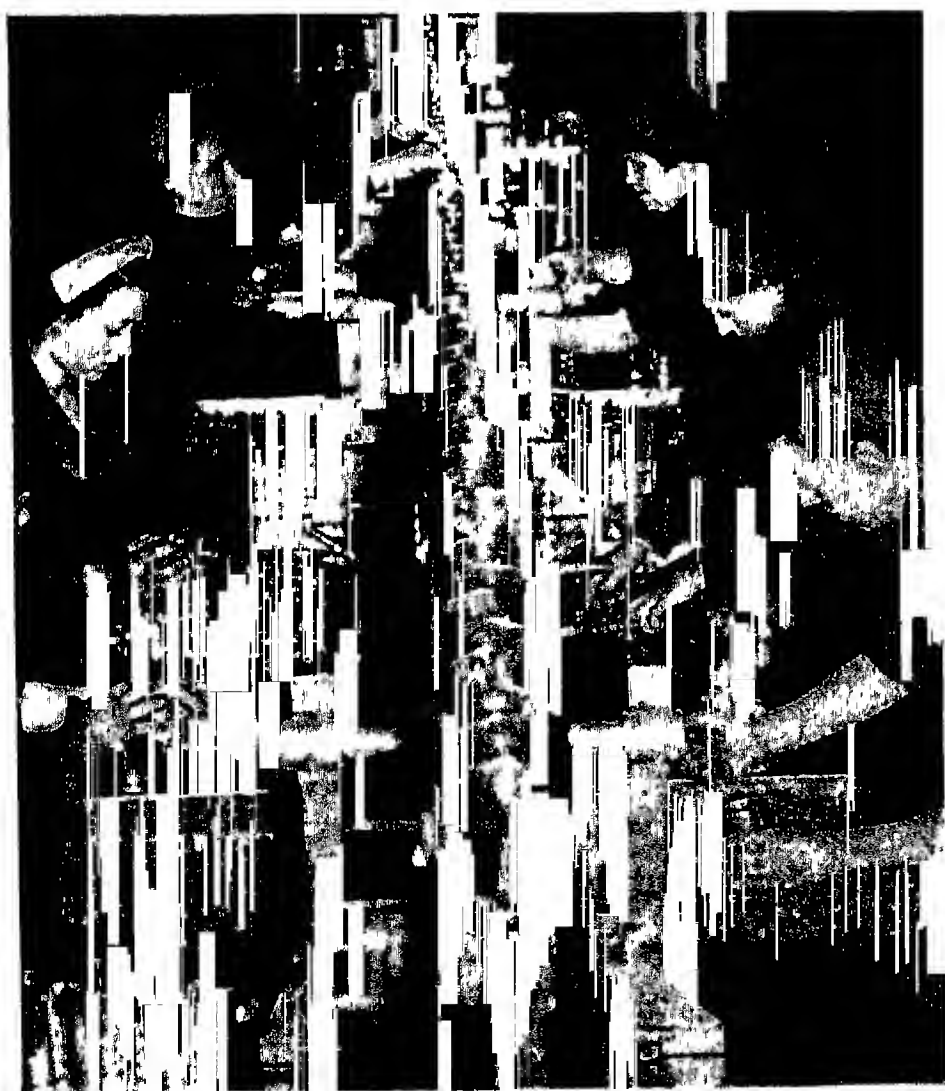
servative, but it was not until 1890 that unsweetened milk was successfully canned. Before canning, evaporated milk is placed in a vacuum pan; a closed metal container to which heat is applied by means of steam coils, and which removes 40 per cent of the milk's water content. The concentrated milk is then forced through fine apertures which divide the fat globules and prevent their rising to the surface of the evaporated milk in the form of cream. The milk is then poured into cans which are totally enclosed except for a small hole in the lid, through which the milk is forced by a nozzle. The hole is then sealed with solder and the can is placed in a steam steriliser.

Normally, Great Britain consumes nearly 2,000,000,000 cans of food per annum, consisting of some 350 varieties of foods and beverages, including such diverse articles as grouse, tripe and onions, roast turkey, butter, sausages, mangoes, black pudding, haggis, beer, and fruit drinks. Dietetic tests have established that canned food retains practically all its vitamin content and will keep indefinitely; cans of meat opened after a lapse of 20 years have been found to be in perfect condition.

In Great Britain the food canning industry was greatly expanded through the demand created by the First and Second Great Wars. In the first, millions of tins of the famous Maconochie Ration of meat and vegetable stew were produced for the feeding of the troops. Between the two wars, new markets were created for British tinned foods, and the monopoly once enjoyed by the U.S.A. and Argentina in the home market was greatly reduced.

Self-heating Cans of Food

Early in 1941 the ministry of Supply invited the H. J. Heinz company to collaborate with Imperial Chemical Industries in the production of self-heating cans of food for military purposes. The principle was adopted of a heating element contained in a small tube built into the centre of the can and ignited by a fuse. In certain instances the fuse was fired by a detonator in the base of the can, which exploded when the can was struck sharply on the ground. The self-heating cans were first used in the raids on St. Nazaire and Dieppe, and vast quantities were issued to the armies taking part in the invasion of Europe in June, 1944. See Dehydration; Food Preservation.



Canning. Gooseberries being canned at a North of England fruit and vegetable canning factory

Canning, CHARLES JOHN CANNING, EARL (1812-1862). Governor-general of India. Born near



Brompton, London, Dec. 14, 1812, the third son of George Canning (*q.v.*), he was educated at Eton and Christ Church, Oxford. He became Conservative M.P. for Warwick, 1836, and Viscount Canning 1837. He was under-secretary for foreign affairs from 1841-46 and postmaster-general 1853-55, when he succeeded Lord Dalhousie as governor-general of India. His impartiality during the Mutiny and the consequent reorganization of India earned him the thanks of both houses of Parliament, and the name of "Clemency Canning" applied to him in the early days of the Mutiny was purged of any contemptuous meaning when his proclamation of amnesty was confirmed. On the transference of the government of India to the crown in 1858 Canning became first viceroy. Created an earl in 1859, he returned to England in 1862, dying in London June 17, 1862. *Consult* Life. H. S. Cunningham. 1891.

Canning, ELIZABETH (1734-73). British perjurer. Born Sept. 17, 1734, the daughter of a sawyer in the city of London and a domestic servant in Aldermanbury, she disappeared, after visiting an uncle and aunt in Houndsditch, Jan. 1, 1753. After she had been publicly advertised for, she reappeared at her mother's house, Jan. 29, in a distressful state. Her story was that she had been attacked by two men in Moorfields and carried off to Hertfordshire, where an old woman had kept her in close confinement because she refused to lead an immoral life. She subsequently identified an old gipsy named Mary Squires as the woman, and a house kept by a Mrs. Wells as the place of her confinement.

Squires, in spite of an alibi, witnessed for and against, was condemned to death, and Wells was burnt in the hand. The lord mayor, Sir Crisp Gascoyne, being dissatisfied with the case, procured the pardon of Squires, and all London was divided on the question of



Elizabeth Canning.
British perjurer

Canning *v* Squires. Finally, on April 29, 1754, Canning was tried for perjury, and was convicted and sentenced to transportation for seven years. Sent to New England, she married, became a school-mistress, and died July 22, 1773. She never disclosed how she spent Jan., 1753.

Canning, GEORGE (1770-1827). British statesman. Born in London April 11, 1770, he was sent to Eton and Christ Church by his uncle, Stratford Canning. He entered Parliament as Tory member for Newport in 1794, and held a series of posts in Pitt's administration, achieving a reputation in the House of Commons as an orator, and among the public by his contributions to *The Anti-Jacobin*. Canning followed his chief in resigning office in 1801 on account



Geo Canning
After Lawrence

of the refusal of George III to accept Catholic emancipation for Ireland. He was treasurer of the Navy during the second administration of Pitt, 1804, after whose death in 1806 he refused to join Grenville's Ministry of all the Talents; in 1807 he joined the Portland ministry as foreign secretary.

It was at this time that Canning forestalled Napoleon by seizing the Danish fleet at Copenhagen, in spite of the neutrality of Denmark; his defence of this act being the definite knowledge that unless he struck at once the fleet would be turned against Great Britain. Vigour and promptitude were his leading characteristics; his aim was to carry on the war with the utmost energy, and he was in some degree responsible for the appointment of Arthur Wellesley, afterwards duke of Wellington, to the command in the Peninsula in 1809. Canning's objection to the policy of Castlereagh (*q.v.*), the war secretary, in diverting troops from Portugal to the Wal-

cheren expedition, ended in a duel between the two ministers, Castlereagh believing that Canning had intrigued against him. Both ministers resigned, but Castlereagh returned to office as foreign secretary in 1812, and Canning joined the administration in 1816 as president of the India board of control. He supported the repressive measures of the Government, but in 1821 resigned office because of his unwillingness to support the action taken against Queen Caroline by the ministers. He accepted the governor-generalship of India in 1822, but on the death of Castlereagh was appointed instead to the post of foreign secretary in the Liverpool ministry.

He maintained Castlereagh's policy of non-intervention in the domestic affairs of European states, but also insisted openly on the right of Britain to intervene when non-intervention was violated by European powers. He followed Castlereagh in recognizing the independence of the South American states which had revolted against Spain, and resolved that the intervention of France on behalf of the Spanish monarchy, 1823, should not extend to America. When the Portuguese constitutionalists appealed for British help, 1825, in their struggle with absolutism, Canning refused aid, but sent to the Tagus a naval squadron, whose presence prevented the French from intervening on the other side. And in 1827 he sent troops to Lisbon to put down a rebellion fostered by the Spanish absolutists. So again, while he refused direct support to Greece in her struggle for independence, he united with Russia in threatening Turkey that if she refused Greek autonomy the powers would recognize Greece as an independent state.

In touch with the more liberal elements in the Liverpool Cabinet, when Liverpool left office in 1827, Canning at last became prime minister, Wellington and the Tories retiring from office. Canning was against parliamentary reform, but determined to carry Catholic emancipation in Ireland. He did not live to see it granted. Four months after taking office he died after a brief illness, Aug. 8, 1827, and was buried in Westminster Abbey. His last act was to arrange a treaty with France and Russia on behalf of the Greeks.

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Canning, SIR SAMUEL (1823-1908). British engineer. Born in Wiltshire, July 21, 1823, he was first engaged on rly. engineering in the W. of England, and in Lancashire, 1844-49. During 1852-69 he was largely occupied in submarine telegraphy and laid the first submarine cable from Newfoundland to Cape Breton Island in 1856. As chief engineer to the Telegraph Construction Co., and mainly responsible for the Atlantic cable of 1866, he was knighted in that year. He died Sept. 24, 1908.

Canning Town. Populous industrial district of E. London, and a ward of the borough of West Ham, Essex. It lies at the junction of East India Road and Barking Road, outside the boundary of the county of London, and has a railway station. Mansfield House, a settlement on the lines of Oxford House and Toynbee Hall, and originated by Mansfield College, Oxford, is in Canning Town, and near by are the Victoria and Royal Albert Docks. The district suffered heavily from German bombs in the Second Great War.

Cannizzaro, STANISLAO (1826-1910). Italian chemist. Born at Palermo, and educated at the university, he filled successively the chairs in chemistry at Genoa, Palermo, and Rome. He discovered benzylic and anisic alcohols, and developed and published Avogadro's theory that "equal volumes of different gases under the same conditions contain the same number of molecules." He also devised methods of determining atomic weights.

Cannock. Urban district and market town of Staffordshire, England. Lying 130 m. by railway



Cannock arms

name to a county constituency. Pop. (1951) 40,927.

Cannon (Lat. *canna*, reed or pipe). Obsolete term for a piece of heavy ordnance having some form of mounting or carriage on which it could be transported or manipulated. The word has been superseded by gun for any weapon larger than a rifle. Cannon were first used in warfare at the battle of Crécy and the siege of Calais, 1346-47. Their barrels were of wood and leather strengthened by iron bands, and fired stone cannon balls. In 1399 the Germans used a cannon firing a projectile weighing 8½ cwt. About the same time the Turks employed a cannon with a calibre of 4 ft. and firing a projectile of 600 lb. In 1460 James II of Scotland was killed by the bursting of a wooden cannon while besieging Roxburgh Castle.

Cannon were first cast in England in 1521. In the 17th century ordnance of certain size were classified as cannon royal, bastard cannon, cathoun, etc., according to their velocity and destructiveness. In the 18th century, and until the term gun was adopted, cannon were classified as ships' cannon, garrison cannon, siege cannon, and field cannon. Nowadays the term

N.W. of London, and 8 m. N.W. of Walsall, it has brick and tile works. Cannock Chase, a wild moor in the neighbourhood, once well wooded, is rich in coal and ironstone. Cannock gives its

has been revived to signify a 20-mm. machine-gun mounted in aircraft. Typical examples are the Hotchkiss and Hispano (*q.v.*). See Artillery; Gun; Ordnance.

Cannon (corrupted form of *carrom* or *carom*). In the game of billiards, a stroke which results in the cue-ball touching both the red and the other white ball before coming to rest. The value of the stroke is two points. See Billiards.

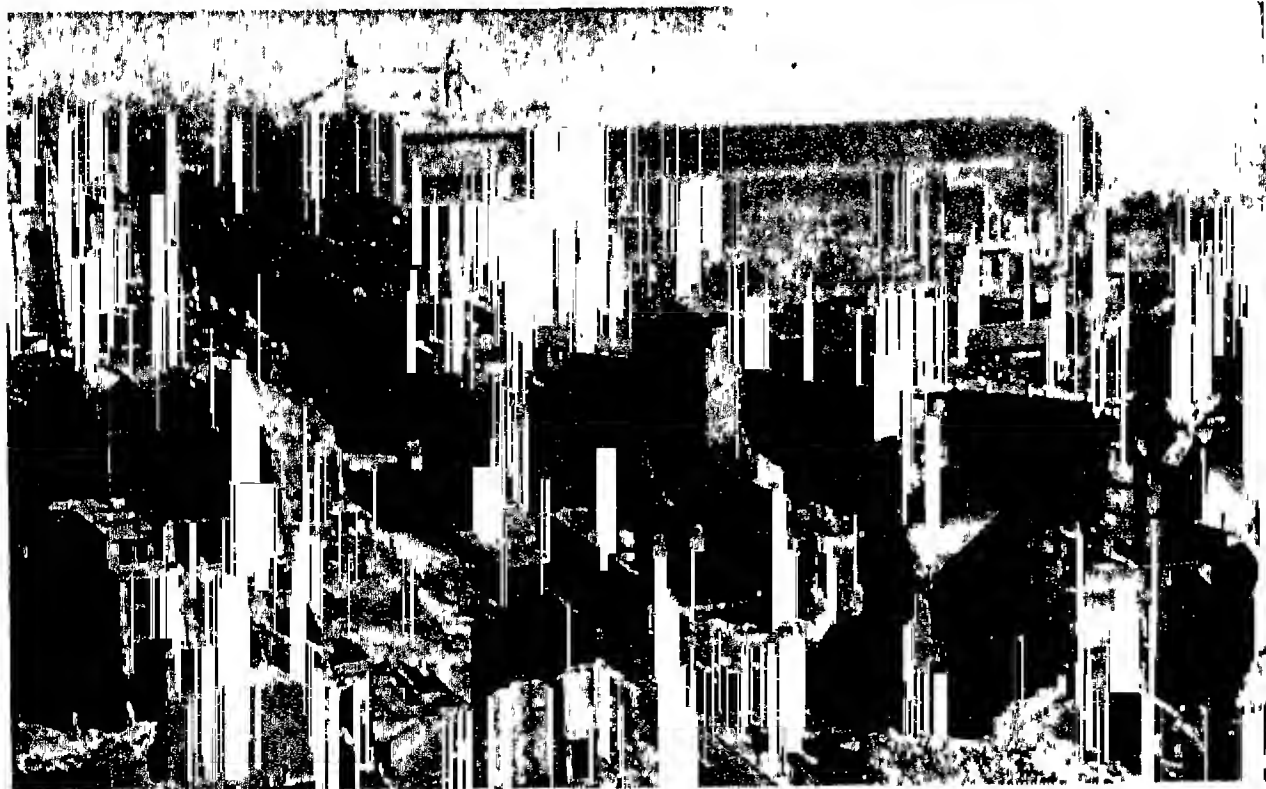
Cannon, Tom (1846-1917). A British jockey. Born at Eton, he was associated with John Day, the trainer, whose daughter he married. As a jockey he won the One Thousand Guineas in 1866, 1878, and 1884; the Grand Prix de Paris in 1866, 1874, 1878, 1883, and 1884; the Two Thousand Guineas in 1878, 1882, and 1887; the Oaks in 1869, 1873, and 1884; the Derby, 1882; the St. Leger, 1880. After giving up riding he became a successful trainer. He died at Stockbridge, July 13, 1917.

His son Tom (1872-1945) was apprenticed to his father as a jockey, and then trained horses at Compton, Berks, 1898-1936, dying near Lymington, Aug. 27, 1945.

Cannon-ball Tree (*Couroupita guianensis*). Evergreen tree belonging to the family Lecythidaceae, native to tropical America and the West Indies. It has alternate leaves; the large flowers springing from the trunk and branches (cauliflory) are about 5 ins. in diameter, reddish-pink and white inside, and yellow outside. The name is derived from the globular fruit, 6-8 ins. in diameter, which has a hard woody shell and contains a large number of small flat seeds. The yellow-brown timber is soft and light but tough; when freshly cut it has a repulsive odour which disappears as it dries.

Cannon Bone. Bone found in the more specialised even-toed ungulate mammals (*Artiodactyla*), consisting of a stout shaft supporting the limb just above the toes. It is formed from the fused 3rd and 4th metacarpals and metatarsals.

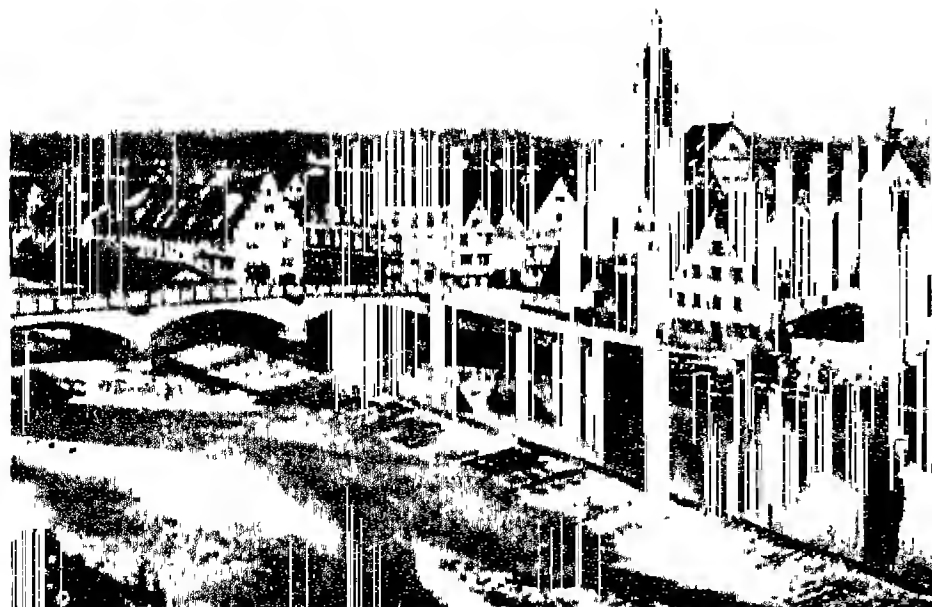
Cannon Street. London street. Extended in 1804, it starts at the south side of S. Paul's Cathedral, and runs E.S.E. until it approaches the Monument. In this street was the hall of the Cordwainers' co.; in the S. wall of the ruined S. Swithun's church is London Stone (*q.v.*). Cannon Street Station, a terminus of the former Southern rly., was built 1866. The section of the street from S. Paul's to Queen Victoria Street was obliterated by German bombs in 1940,



Cannon Street. View taken from S. Paul's Cathedral of the devastation wrought in this area by German bombs in 1940-41. The long roof of Cannon Street railway station can be seen beyond the ruins

and the rest of the street, including the station, was much damaged in several raids.

Cannstadt. Suburb of Stuttgart, until 1905 a separate town of



Cannstadt, Germany. View of this suburb of Stuttgart, once the capital of Württemberg

Württemberg, Germany. It stands on both banks of the river Neckar, at the head of navigation, and is chiefly famous for its mineral springs, which are efficacious in diseases of the throat and nervous complaints. Before the Second Great War it had rly. shops, spinning and weaving mills, chemical works, and manufactures of automobiles and beer. Near the town the kings of Württemberg had two palaces; on the Rotenberg was the family mausoleum. Cannstadt was known in the 8th century, and in the 14th became the capital of Württemberg for more than a century. The French gained a victory over the Austrians here on July 21, 1796. See Stuttgart.

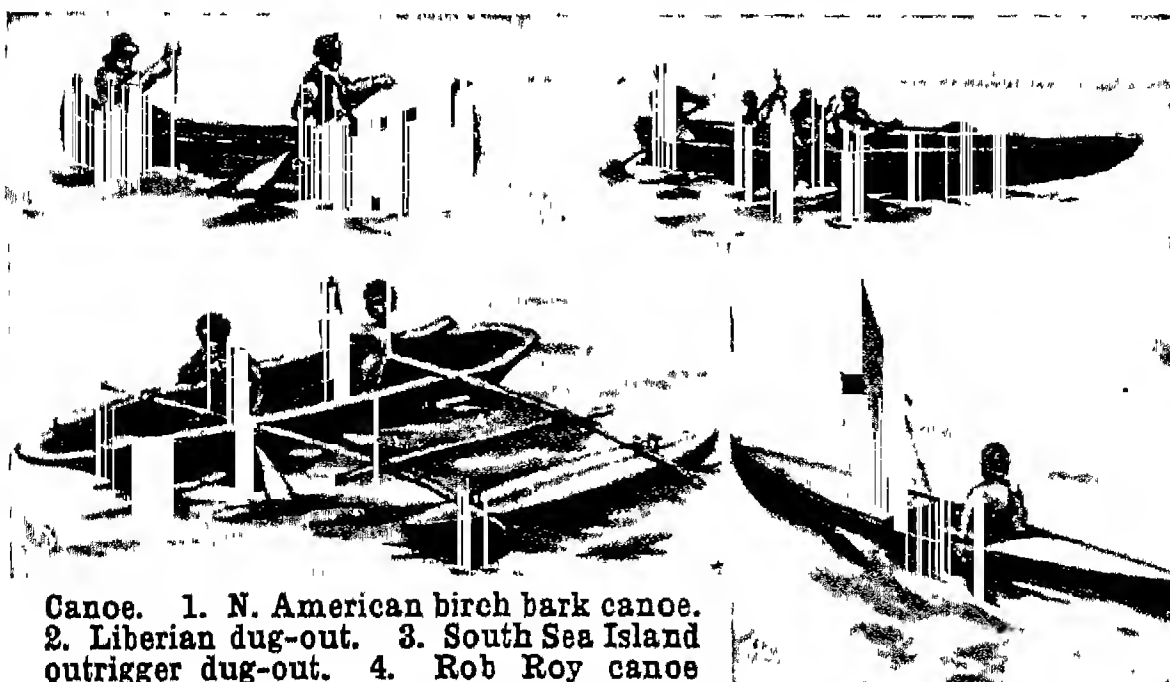
Cano, ALONZO (1601-67). Spanish painter, sculptor, and architect. He was born in Granada, March 19, 1601. His father taught him architecture, Juan Montañez sculpture, and Francesco Pacheco, the master of Velazquez, and Juan del Castillo, painting. His paintings were usually sacred and devotional. Philip IV appointed him court painter and royal architect, giving him the rank of canon. He died Oct. 5, 1667.

Cano, JUAN SEBASTIAN DEL (c. 1476-1526). Spanish navigator. One of Magellan's companions, he took command of the expedition on that seaman's death in 1521, and after visiting the Moluccas

returned to Spain in 1522, being the first to sail round the world. The voyage took three years, and Cano's ship, the *Victoria*, was long kept at Seville. He died on a later expedition in the Pacific.

Canoe (Span. *canoa*, through Carib, *cano*). Light boat propelled manually by one or more paddles. The canoe is one of the most primitive forms of boat. It was made either from a hollowed-out tree trunk, or pieces of bark or hide joined together. The N. American Indians, who achieved the

highest development in this type of boat-building, made canoes of a framework of cedarwood covered with buffalo hides or with pieces of birch bark stitched together. Some S. American and Australian tribes made them from



Canoe. 1. N. American birch bark canoe. 2. Liberian dug-out. 3. South Sea Island outrigger dug-out. 4. Rob Roy canoe

a single sheet of bark. Eskimo canoes consisted of a bone framework covered with seal or walrus skin. Fiji Islanders' canoes carry a single sail and are fitted with outriggers.

On account of its ease of manipulation and portability, the canoe early achieved popularity as a means of recreation. Considerable impetus was given to the sport by John MacGregor's voyages (1866-1869) in his celebrated canoe *Rob Roy*. This was 14 ft. long, had a beam of 26 in., and weighed 72 lb. inclusive of masts and sails. Sporting canoes are generally built of wood, but galvanised iron, rubber, and oiled paper have been used. Most canoes used in Great Britain are made of strips of hard-grained wood $\frac{3}{16}$ in. thick. A recent

development is moulded plywood construction. Wood veneers are sprayed with resin and secured over a "former" of the ultimate shape of the boat. The assembly is then sealed in a rubber blanket and placed in a pressure oven to polymerise the resins. When the hull is perfectly hard it is removed from the oven, the rubber bag stripped off, and the canoe cooled with a water spray. The average sporting canoe carrying one person is 13 ft. long, with a beam of 26 in. and a draught of 12 in. Canoes for two paddlers are about two-thirds larger.

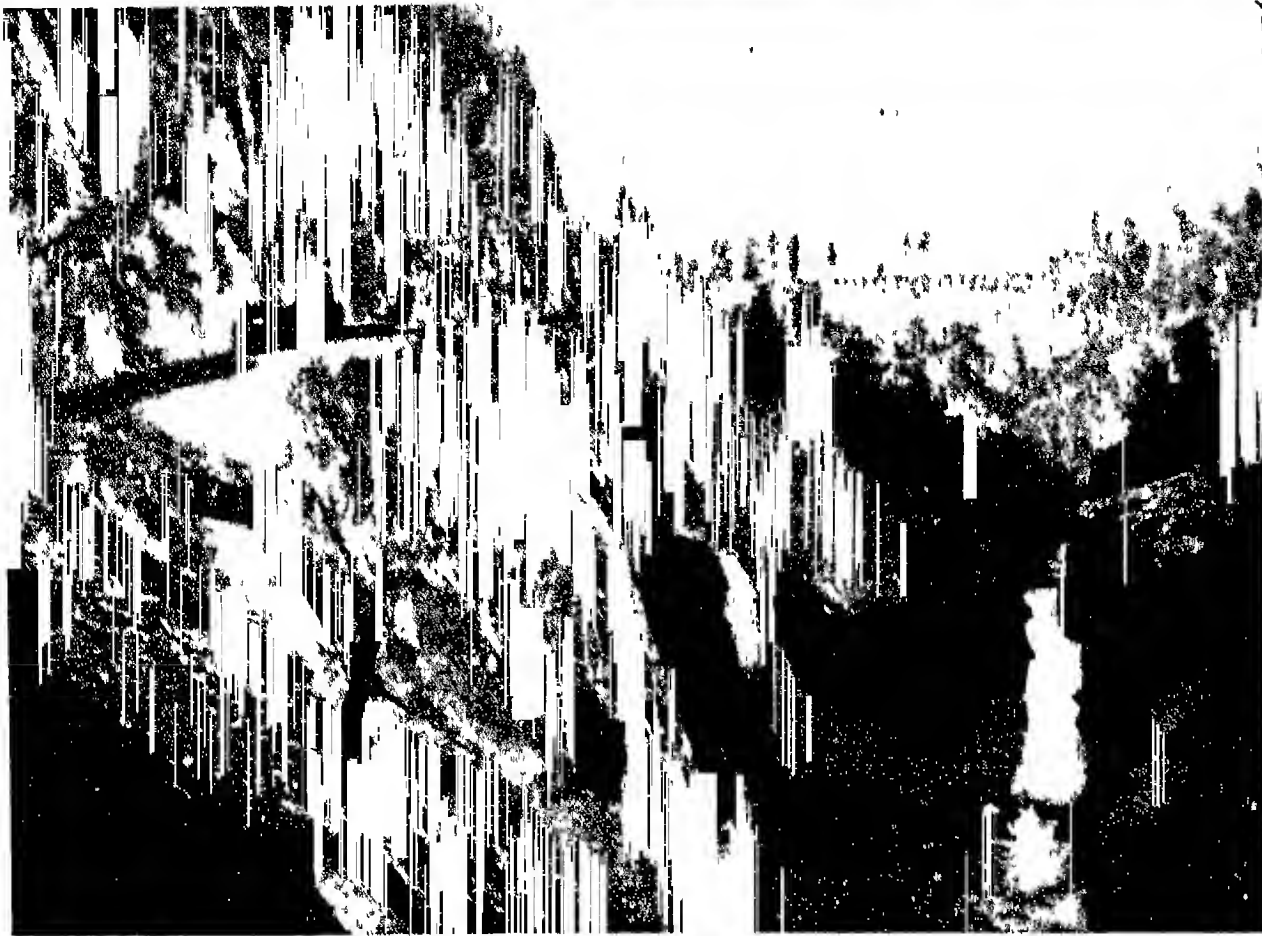
Bibliography. *A Thousand Miles in the Rob Roy Canoe*, and *Description of the New Rob Roy Canoe*, John MacGregor, 1866; *Canoeing*, W. Bliss, 1934; *Canoes and Canoeing* (with a guide to Scottish waters), J. Marshall, 1937; *Canoe Country*, F. P. Jacques, 1938.

Canon (Gr., rule, model). Musical composition based upon imitation. One voice or part (*dux*) leads off and another (*comes*) follows at an agreed interval of time and pitch. Any interval may be used, also the devices of Inversion,

Augmentation, Diminution, and Retrogression (Can-crizzans). When a canon can be performed many times over without a break it is called infinite; when it has a full close or coda it is finite. A famous three-part canon is William Byrd's *Grace, Non nobis, Domine*. Thomas Tallis's hymn-tune, known as Tallis's canon, has imitation

at the octave between treble and tenor, with free harmonies for alto and bass. Mendelssohn's four-part song *The Nightingale* is a double canon, treble and alto being imitated at the octave by tenor and bass.

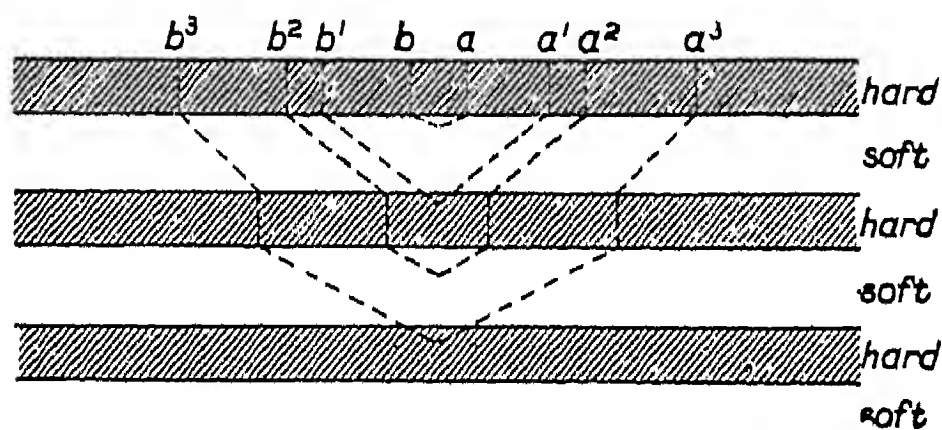
Cañon OR CANYON (Span., tube). Deep, steep-sided, gorge-like river valley. Best developed in high, arid plateaux, the typical example of such formations is found in the W. states of the U.S.A. where there is an almost rainless plateau, in parts over 8,000 ft. high, crossed by the Colorado river, which receives its water supply from the Rocky Mts. The river and its tributaries have cut their way vertically downwards through the plateau, which is composed of horizontal layers of hard and soft rocks; but owing to the lack of



Cañon de las Animas, one of the most impressive of the wonderful cañons of Colorado, viewed from the railway which follows its course

rainfall there has been a minimum weathering of the valley sides such as takes place in an area where the rainfall is not deficient. The hard rocks form steep cliffs and the soft rocks gentle slopes, thus causing the valley to assume the shape of a very narrow letter V.

The deepest of the Colorado cañons is the Grand Cañon (*q.v.*) of Arizona, in which the river flows for some 217 m. at the bottom of a chasm more than 5,500 ft. deep and varying in breadth from 2 m. to 15 m. One of its most wonderful features is the colouring of the rocks, the grey of the limestone, the red of the sandstone, and the darker colours of the old layers below the sedimentary rocks



Cañon. Diagram illustrating development of a cañon where the river flows over alternate layers of hard and soft rock

through which the river has cut its way. See Colorado.

Canon (Gr., list, rule). Term originally applied to all clergy (*canonici*) on the list at each church. Later it was restricted to cathedral clergy; canons regular, who lived under a rule such as that laid down by Chrodegang, bishop of Metz, in 760; and secular canons so called because they moved *in saeculo* (in this world) and undertook the cure of souls. Down to

the Reformation certain English cathedrals were served by monks, one by canons regular, others by secular canons.

Residentiary canons have a right to a seat in the choir, a voice in the decisions of the chapter, and a prebend or competent portion of the chapter revenues. All the older English cathedrals have them, and the custom is that there shall always be one of them in residence.

Honorary canonries were instituted in England in 1842 to enable bishops to confer distinction on deserving clergymen. The number was fixed at 24. A minor canon or vicar choral or priest vicar is in origin the deputy of a canon; he has no prebend,

no voice in the chapter's decisions, and is not responsible for the preaching. In the 18th century prebend-carrying canonries were often sinecures, a condition of things which was ended by the Pluralities Acts.

For the canons

regular of the Roman church see Augustinians; Premonstratensians.

Canon, APOSTOLIC. Collection of ancient eccles. decrees. In number 85 in the Eastern and 50 in the Western Church, they are said to have been first promulgated by Clement of Rome under the direction of the apostles. Originally in Greek and probably dating in their collected form from the 5th century, 50 were translated into Latin about A.D. 500 by a monk named Diony-

sus Exiguus; the remainder were first published about 60 years later by John of Antioch, patriarch of Constantinople.

Canon, BIBLE. A list of books in the O.T. and N.T. which are accounted of Divine inspiration. While the canon of the N.T. is of general acceptance throughout all Christian churches of the E. and W., the canon of the O.T. in the Roman Catholic Church includes those books which, excluded from the Jewish list, were rejected by Protestants at the Reformation, and are classed as Apocrypha in the Church of England.

Canonbury. Dist. of London in the S.E. of the bor. of Islington, served by electric rlys. and London Transport. Its chief place of interest is Canonbury House and Tower. The tower is the restored remains of Canonbury Manor built for the priors of S. Bartholomew the Great, Smithfield. The manor passed to the Spencer family, whose descendant, the marquess of Northampton, is the



Canonbury Tower, Islington, used as an amateur repertory theatre

present owner. When the tower was let as apartments, Goldsmith and Washington Irving resided there. It has been used as a community centre, and as a theatre by the Tavistock amateur company.

CanoneSS. Woman belonging to the Roman Catholic Church who lives under a similar rule to that of canons regular. The rule dates from S. Augustine of Hippo, and chapters of canonesses existed in France by the 8th century. Their chief duties were educational.

Canonesses regular are bound to the daily recitation of the Divine Office, and though they may undertake educational work, it must not interfere with their primary duty. Two of the houses of Augustinian prioresses in England

are: S. Monica's, Hoddesdon, and Our Lady of Good Counsel, Haywards Heath. The Haywards Heath house has a school. The English chapters originated from the congregation of Windersheim, to which Thomas à Kempis (c. 1379-1471) belonged.

Canongate. THE. Famous Edinburgh thoroughfare. Built originally by the canons regular of Holyrood Abbey, and once the main thoroughfare between Holyrood Palace and the city, it was ruled as a burgh. For several centuries a place of residence of men and women famous in Scottish history, of later years it has been the subject of civic plans of improvement and of religious missions devoted to the welfare of the poor living in its closes and wynds. Some of its old and picturesque houses remain, more or less adapted to modern uses: Moray House, built in 1628, and Queensberry House, dating from 1681, for example. The Tolbooth was erected in 1591. In the burial ground behind the church, 1688, were interred Robert Fergusson, the poet, over whose grave Burns placed a simple monument, Dugald Stewart, and Adam Smith. *See* Edinburgh; *consult also* Traditions of Edinburgh, R. Chambers, new ed. 1868; The Burgh of Canongate, John Mackay, 2nd ed. 1886; Old Houses in Edinburgh, drawn by B. J. Home, described by G. B. Brown, 1905-7.

Canongate, CHRONICLES OF THE. Stories by Sir Walter Scott. The first series contains an account of the imaginary editor, Chrystal Croftangry, and three tales, The Highland Widow, The Two Drovers, and The Surgeon's Daughter, published 1827; three stories, nominally in the series, My Aunt Margaret's Mirror, The Tapestry Chamber, and Death of The Laird's Jock, being given to Heath's Keepsake for 1829. The second series contains The Fair Maid of Perth, 1828.

Canonical Hours. Set hours of prayer and praise, collectively known as the Divine Office. Their origin is traced to the Jewish practice of praying thrice a day (Ps. 55, Dan. 6), adopted by the Apostles (Acts 2, 3, 10). In the Western Church they were gradually increased from three to the following: matins, soon after midnight; lauds, at daybreak; prime, 6 a.m.; terce or tierce, 9 a.m.; sext, noon; nones, 3 p.m.; vespers, 6 p.m.; compline, bedtime.

The governing idea was that Christians throughout the world should join in prayer and praise at



Canongate, Edinburgh. The Tolbooth, built in 1591, a famous landmark of old Edinburgh

the same hours, but in practice the observance became confined to members of religious orders and ecclesiastics. The Anglican church services of matins and evensong—constructed, the former from matins, lauds, and prime; the latter from vespers and compline—are congregational. In the Greek Church, which has eight canonical hours, prayers are for the most part said three times daily. The offices of the hours will be found in the

Roman and Sarum breviaries. In England the term canonical hours is applied to those between 8 a.m. and 6 p.m., before or after which marriage cannot lawfully be performed in any church.

Canonicals. Dress prescribed for a clergyman when officiating by the canons of the church to which he belongs. *See* Vestments.

Canonisation. Process in the Roman Catholic Church of declaring and decreeing that a person is to be venerated as a saint. From the 2nd century the anniversary of a martyr's death was observed in the Church, and by the 4th century men and women of holy life were commemorated by special services.

It was not until 1634 that Pope Urban VII officially ordered that in the R.C. Church canonisation must be carried out by the pope, under whose auspices the process usually extends over a number of years. The congregation of rites is the official body deputed by the pope to examine all causes brought forward. If the claims are satisfactory the person is first beatified, and permission given for local veneration. The final stage makes the precept of reverence of general obligation in the R.C. Church, and appropriate additions are made to the service books. The fees for canonisation are heavy.

CANON LAW: ITS HISTORY & INFLUENCE

Richard O'Sullivan, Q.C., Benchers of the Middle Temple

The author outlines the beginnings of Canon Law and traces its development, including the Roman Catholic Code of 1917, and explains the relationship of ecclesiastical decrees to common law

The canon law is the body of ecclesiastical law which governs the life of the Christian Church and of its members. Its beginnings may be traced in the Acts and the Epistles. In the heyday of the Imperial power and of Roman jurisprudence, congregations of non-conforming Christians developed a body of internal law "with ominous rapidity." It was destined to be a system of constitutional and governmental law which endowed the bishop of each congregation with manifold powers, including the power to exclude offenders from participation in religious rites. These various Christian communities were united by bonds "that were too close to be federal"; and the bishop of Rome established a pre-eminence which passed into the primacy of the pope.

In the 4th century under Constantine, Christianity became a

lawful religion. The first collection of ecclesiastical laws and rules was made by a Scythian monk, Denys the Little, who brought together the legislation of the earlier councils of the Church, and of the popes. Other collections were made until, in the 12th century, a monk of Bologna, Gratian, published the Concordia Discordantium Canonum which was an attempt to give a consistent statement of canon law. The work came to be known as the Decretum Gratiani and was much used in the law schools of England and of Europe.

The Decretum was supplemented by Decreta and Decretals of succeeding popes. Decreta are ordinances made by the pope with the advice of the cardinals, in cases where no question has been raised; Decretals are decisions given by the pope without reference to the cardinals, on questions proposed to him. All

these collections with the Sext and the Extravagants found a place in the Corpus Juris Canonici, published by Gregory XIII. 1580.

To the uncoded legislation of the 15th and 16th centuries were added the papal constitutions of succeeding centuries and the decrees of the Roman congregations which were founded by Sixtus V in 1587.

The Roman Catholic Code

The bishops assembled at the Vatican council in 1870 expressed a desire that the whole of the canon law might be codified and necessary amendments made to meet changed conditions. In 1904 the immense task of codification was set on foot under a committee of whom the leading spirit was Cardinal Gasparri, afterwards papal secretary of state. In 1917 the new code of canon law was promulgated and ordered to be brought into effect throughout the Roman Catholic church in the following year.

The code of 1917 is divided into five books: (1) *Normae Generales* (86 canons); (2) *De Personis* (639 canons); (3) *De Rebus* (826 canons); (4) *De Processibus* (643 canons); and (5) *De Delictis et Poenis* (200 canons). The *Normae Generales* state the general principles of Church law, custom, reckoning of time, privileges, and dispensations. Laws are declared to be promulgated by being published in the official *Acta Apostolicae Sedis*. A custom which is at variance with a written law is stated to have force only when it is not an abuse, and when it has been in vogue for a period of forty years without being denounced by authority.

De Personis falls into three parts, *De Clericis*, *De Religiosis*, and *De Laicis*. The first part deals with the rights, privileges, and obligations of the clergy in general, their admission to and loss of office, and their ordinary and delegated jurisdiction. It treats of popes, general councils, cardinals, the Roman curia, papal legates, patriarchs, primates, plenary and provincial councils, vicars apostolic, bishops, synods, the diocesan curia, cathedral chapters, etc. The second part states the law concerning religious orders and congregations. The third part deals with confraternities and associations of lay folk for religious purposes.

De Rebus contains legislation touching the seven sacraments, burial rites, fasting and abstinence,

divine worship, vows and oaths, seminaries, schools and universities, etc.

De Processibus contains the rules of procedure and the principles to be followed in the various courts of the Roman church.

De Delictis et Poenis gives a definition of crime as understood in ecclesiastical law, explains the circumstances which aggravate or lessen guilt, and states the general rules which apply to ecclesiastical penalties, e.g. excommunication, suspension from office, and so forth.

It used to be thought that the canon law of the Roman Church "was never imposed upon the kingdom of England"; and that its authority as law depended upon its being "received and admitted by the consent of parliament, or by immemorial usage and custom in particular places and courts." As lately as 1883, the report of the Ecclesiastical Courts Commission stated that "the canon law of Rome, although always regarded as of great authority in England, was not held to be binding on the ecclesiastical courts." But this opinion was rejected by F. W. Maitland in a notable volume on Canon Law in the Church of England, 1898. The opinion of Maitland is now accepted by scholars. In England, of course, and one may say in every country of Europe, there was in force a supplementary system of ecclesiastical law composed of legatine constitutions, i.e., constitutions promulgated by the pope's legate in that country.

In the Church of England

In 1533 Henry VIII, declaring that "the realm of England is an Empire," announced that the imperial crown of this realm possessed spiritual as well as temporal jurisdiction, and declared appeals to the pope from the ecclesiastical courts in England to be unlawful. Henry also prohibited the academic study of the canon law in England and established instead at Oxford and at Cambridge regius professorships in the Roman civil law.

A proposal made by parliament in the reign of Henry VIII that the existing body of ecclesiastical law should be examined with a view to its revision and codification, was not carried out. Parliament declared that the existing canon law should continue in force, so far as it was not repugnant to common or statute law, or the king's prerogative. In

this way, after 1534, any provision of the canon law which was contrary to the law of the land was not binding in England. Existing canon law was taken to be binding upon the clergy and the laity and was administered until 1857 in a system of ecclesiastical courts by civilian lawyers, i.e., by men trained in the principles of the Roman civil law as opposed to the Roman canon law and the English common law. In 1857, the jurisdiction which used to be exercised by the civilian lawyers in matrimonial and in testamentary causes was transferred to the judges of the common law and is now exercised by the probate, divorce, and admiralty division of the high court. The civilian lawyers surrendered their charter and disposed of their property at doctors' commons.

After the Reformation, canons made by convocation, not having the authority of an Act of Parliament, were not binding on the laity. In the reign of James I, 141 canons enacted by the bishops and clergy in convocation came to be known as the canons of 1603. These were sanctioned by royal charter but not confirmed by statute; and, though they are deemed to bind the clergy, they do not bind the laity save in so far as they are declaratory of the common law. In 1942, it was declared in the court of appeal "that spiritual courts still have and ought to have full and unfettered disciplinary jurisdiction over clerical persons," but as regards the laity (save in matters concerning the fabric or ground of a church or churchyard, and offences of churchwardens in respect of their office) their jurisdiction is "obsolete and gone beyond recall."

Breaches of the canon law by the clergy of the English Church are punishable as an ecclesiastical offence, but the procedure is not regulated by statute. Proceedings are taken under the Church Discipline Act of 1840, or the Public Worship Regulation Act of 1874, or the Clergy Discipline Act of 1892.

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Canon of the Mass. The most solemn part of the R.C. liturgy, and so entitled as being the rule or unchanged service. It begins after the Sanctus and contains the prayer of consecration.

Canons. An estate near Edgware, Middlesex, England. Deriving its name from the priory of S. Bartholomew, Smithfield, granted in 1544 to Sir Hugh Losse, and bought in 1604 by Sir Thomas Lake, it passed in 1710 to James Brydges, afterwards duke of Chandos (*q.v.*), by his marriage with a daughter of the Lake family. Here the duke, at the cost of nearly £250,000, built a mansion, the theme of Pope's Epistle on False Taste, laid out a park and grounds, and lived in great state. He partly rebuilt S. Lawrence's Church, Little Stanmore, to serve as his chapel, and Handel was his choirmaster. In 1747 the materials of the mansion were sold for £11,000. Bought by a London cabinet-maker named Hallett, who built a villa on the site of the mansion, Canons was sold by Hallett's grandson to Dennis O'Kelly, owner of the racehorse Eclipse, which was buried in the park. The estate is now part of the residential district of Canons Park, which has a station on the Bakerloo tube rly.

Canopic Jars. Set of four jars, of alabaster, terra-cotta, or wood, containing the entrails of embalmed human bodies in ancient Egypt. The lids, shaped to depict their protecting deities, were

respectively man-headed (stomach), dog-headed (small intestines), jackal-headed (lungs, heart), hawk-headed (liver). Ancient Mayan jars of similar type have come from Central America. The term denotes also the cinerary urns of Etruscan tombs.

Canopus. Brightest star of the constellation Carina (Alpha Carinae). It is in the southern heavens and is second in brightness only to Sirius. It has a very small parallax, and must be at least 270 light years distant, so that its light may be equivalent to that of 13,000 suns like ours.

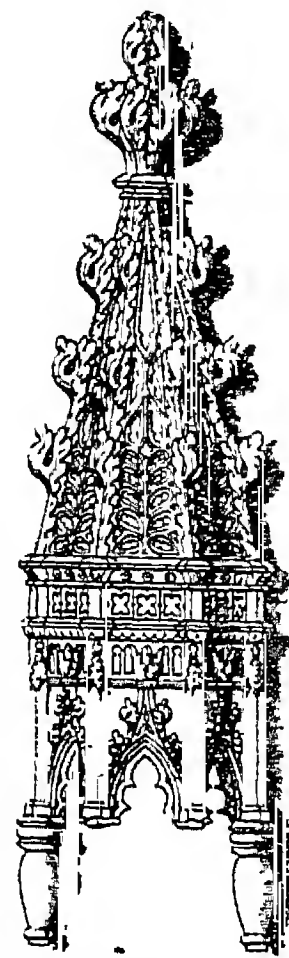
Canopus. Ancient town, the site of which was near Abukir, Lower Egypt. It gave its name to the Canopic branch of the river Nile, and was a busy trading mart until Alexandria, in the course of time, superseded it. At Canopus was a celebrated temple of Serapis. A trilingual decree of the priests of Canopus, preserved in the Cairo Museum, conferred honours on Ptolemy Euergetes in 238 B.C. The funerary urns called Canopic jars (*v.s.*) take their name from this Egyptian city.

Canopy (Gr. *konopeion*, mosquito-curtain). Term signifying generally a roof of hard or soft material supported on pillars or poles. It is applied in architecture to the stone or wood covering of pointed or circular form over a door, niche, window, or tomb. Different species of canopy are the baldachin and ciborium. Canopies appear freely in the Decor-

ated and Perpendicular periods of English architecture, and may be noted over figures in Lichfield

cathedral, which are surmounted by crockets and finials. Others are of pedimental shape, as those at S. Mary-the-Virgin's, Oxford. They are occasionally found in late Norman work, and they often constitute works of great beauty on mediæval tombs. See Architecture.

Canosa di Puglia. Town of Italy, in the prov. of Bari. It stands on a hill near the Ofanto river, 15 m. S.W. of Barletta. Occupying the site of the ancient



Canopy in a buttress, Roslyn chapel, Edinburgh

Canusium, it has a 12th-century cathedral containing the tomb of Bohemond, prince of Antioch, who died in 1111, a ruined castle, and remains of the Roman amphitheatre. Near by is the battlefield of Cannae (*q.v.*), 216 B.C. Pop. (1951) 33,800.

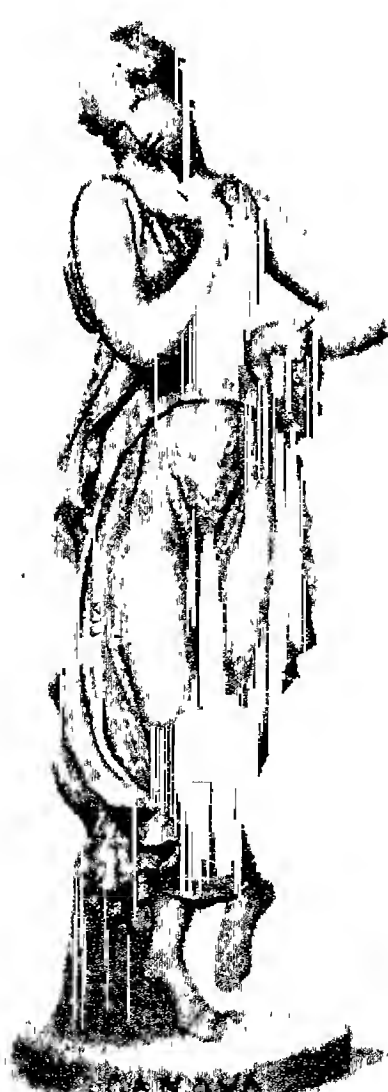
Canossa. Village of Italy, in the province of Reggio Emilia, 12 m. S.W. of the city of Reggio. Its castle is noted as the scene in 1077 of the humiliation of the emperor Henry IV before Pope Gregory VII (Hildebrand). This important stronghold belonged to the celebrated Matilda of Tuscany, who died in 1115. It was destroyed in 1255, and the few ruins are now a national monument.

Canova, ANTONIO, MARQUIS OF ISCHIA (1757-1822). An Italian sculptor. Born at Passagno, in Treviso, Nov. 1, 1757, he studied at Venice and in 1780 went to Rome. His works were extremely lifelike, and recalled the spirit and style of ancient Greece. Among the most famous



Antonio Canova, Italian sculptor After Sir Thos. Lawrence

of them are Perseus with the head of Medusa, Cupid and Psyche (several versions), The Three Graces, The Magdalen, Venus Leaving the Bath, and The Dancing Nymphs, and the sepulchral monuments to



Canova. Examples of this Italian sculptor's art. Left, Hebe, from the statue at Chatsworth. Right, The Dancing Girl Reposing

Clement XIII and Clement XIV. He also produced numerous portrait busts and statues, including a nude figure of Napoleon I. He died Oct. 13, 1822.

Canovas del Castillo, ANTONIO (1828-97). Spanish statesman. Born at Malaga, June 5, 1828, he studied at Madrid, became a journalist and politician, and entered the Cortes as a Liberal in 1852. In 1864 he was minister of the interior and in 1865 minister of finance. Banished for his Liberal principles in 1867, he returned in 1869, and as a moderate Conservative helped to make Alphonso XII king in 1874. Between 1874-97 Canovas as the Conservative leader was six times prime minister of Spain. He was assassinated by an anarchist Aug. 8, 1897. His writings include poems and essays.



Canovas del Castillo.
Spanish statesman

Canrobert, FRANÇOIS CERTAIN (1809-95). French soldier. Born at Saint-Céré June 27, 1809, he entered the army in 1828, and played a distinguished part in the campaigns in Morocco for nearly twenty years. In 1854 he was sent to the Crimea under St. Arnaud, received the chief command on the death of the latter, and became a marshal in 1856. He held a command in the Italian campaign of 1859, and in the Franco-Prussian War of 1870 he surrendered with Bazaine at Metz. Made a senator in 1876, Canrobert died in Paris Jan. 28, 1895.

Canso, CAPE. The easternmost extremity of Nova Scotia, Canada. It is on the S. side of Chedabucto Bay in lat. 45° 17' N., long. 61° W. A wireless direction-finding station is established here. Near by is Canso, a port of entry and important fishing centre, and

the terminus of eighteen Atlantic cables. Here are the headquarters of the Commercial Cable Co. and the Western Union Cable Co.

Canso, GUT OF. Channel between Nova Scotia and Cape Breton Island, Canada. Connecting the Atlantic with Northumberland Strait, it is some 17 m. long and has an average breadth of 2½ m. Also called Strait of Canso.

Cant (late Lat. *cantus*, a corner, Lat. *cantus*, song). Term used technically and in other senses for anything not straight. Technically it is applied to an angle as of a bolt-head, a squared log, or a room; a tilt or inclination from a level; a segment of the rim of a wooden gear-wheel; a niche. It is also used to describe any insincere or whining form of speech, especially verbal affectation of piety, to the slang or argot of gipsies and vagabonds, and to the phraseology peculiar to any profession. In beggars' slang it means a blow, a gift, or a toss.

Cant. Aircraft constructed by the Italian naval construction firm, Cantiere Monfalcone, of Trieste. Cant flying-boats and seaplanes were used by Italy in Mediterranean operations during the Second Great War. The principal types employed were a flying boat and a twin-float seaplane. The former, designated Z-501, has a single engine. The Z-506 float seaplane was in the three-engined class, and could carry bombs or a torpedo.

Cantabile. An Italian musical term for "in a singing manner." A popular piece known as Andante Cantabile is the slow movement of Tchaikovsky's first string quartet in D, op. 11.

Cantabrian Mountains. Westward prolongation of the Pyrenees. They extend along N. Spain to Cape Finisterre for more than 300 m. and have a breadth of 60 m. to 110 m. They descend abruptly to the sea, and more gradually to-

wards the south. Among the highest points are the Torre de Cerredo, 8,784 ft.; Peña Vieja, 8,744 ft.; Peña Prieta, 8,295 ft.; and the Espingüete, 7,895 ft.; there are many other peaks above 6,000 ft. The Puerto de Pajares, 4,475 ft., carries a rly.

Cantacuzene (Cantacuzenus). Name of a Byzantine family, the chief member of which was the emperor John V or VI (*q.v.*).

Cantal. Department of south-central France. Formerly part of the province of Auvergne, it is mainly a volcanic region, embracing an area of 2,230 sq. m. and including the Cantal range, which gives to it its name. Aurillac is the capital, and the dept. is divided into three arrondissements, Aurillac, St. Flour, and Mauriac. The chief rivers are all short—the Alagnon, Truyère, Cère, and Rue; they are full of fish. There are some minerals, and game is plentiful. Cantal gives its name to a hard cheese. Pop. (1954) 177,065.

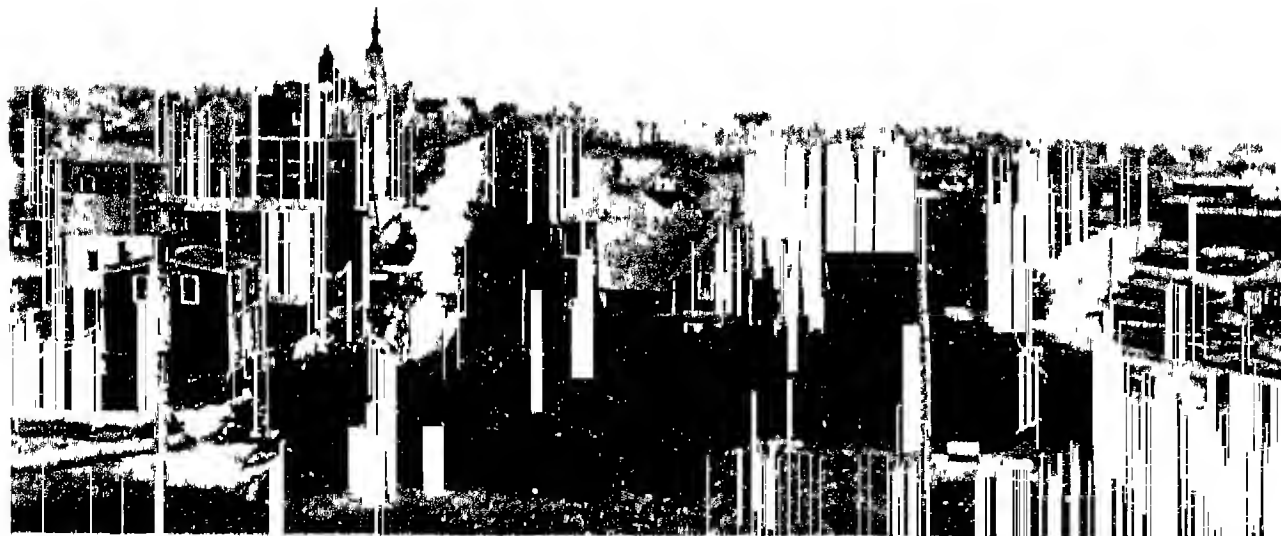
Cantalupe OR CANTALOUPE. Variety of melon coming originally from Armenia, but introduced to Britain from Cantalupo, near Rome, hence its name. It is distinguished by its small, round shape and tough, irregularly meshed, netted surface. See Melon.

Cantata. Term originally used to indicate music to be sung, as distinguished from sonata, music to be played. It now describes a composition similar to an oratorio, consisting of solos, duets, etc., and choruses, but shorter and not necessarily on a sacred subject. J. S. Bach wrote over 200 cantatas for occasions in the Christian calendar. See Oratorio: Sonata.

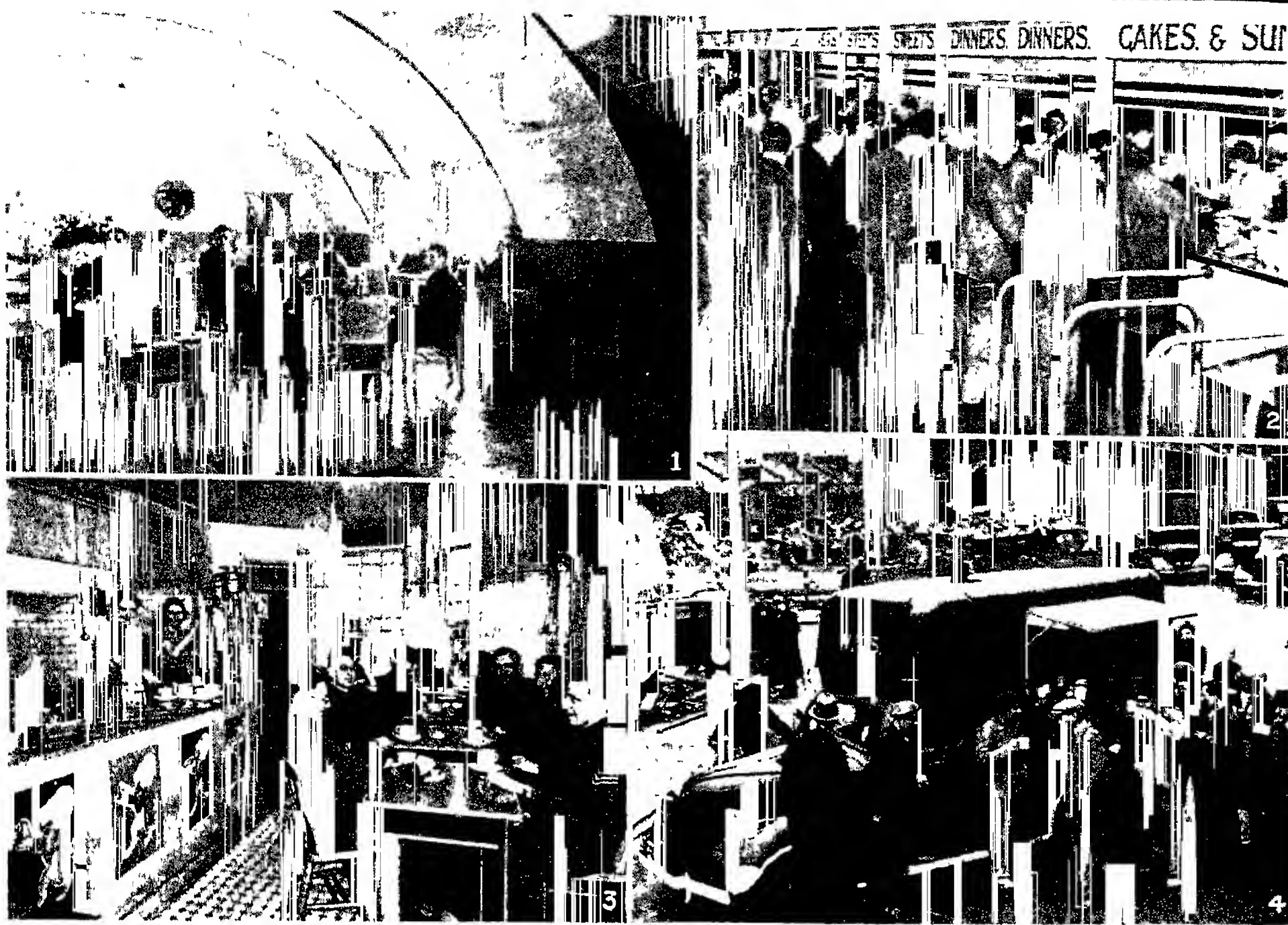
Cantate Domino (Lat. Sing to the Lord). First words in the Vulgate of the 98th psalm in the English Prayer Book (97th in the Vulgate). The psalm was appointed in 1552 to be sung as an alternative canticle to the Magnificat (*q.v.*) at evensong, and still may be unless it has been used among the psalms for the day. The Cantate did not appear in the medieval vespers or compline.

Canteen (Ital. *cantina*, wine-cellar). Originally a soldier's water-bottle; also name given to the semi-cylindrical mess tin carried by British troops in the First Great War. The term is now generally applied to establishments providing refreshments and necessities for personnel of the armed services and groups of workers.

At one time British canteens were conducted on a regimental or



Canso. The easternmost town of Nova Scotia, a flourishing port and the site of a large wireless direction-finding station



Canteen. 1. Type of the modern Naafi canteen. 2. Counter service at a Ministry of Aircraft Production factory, 1944. 3. Service canteen in London, 1944, equipped by gifts from S. Rhodesia and Uganda. 4. W.V.S. mobile canteen refreshing workers on a newly bombed site, 1942

ship basis: the purchase and retail of the goods sold was let out to private contractors, many of whom were more concerned with profit-making than with the provision of amenities. In 1894 a canteen and mess cooperative society was formed by three army officers with the object of purchasing goods wholesale, for retail sale to army units, all profits being returned to the units for expenditure on newspapers, sports gear, meals, etc.

In 1915 an army canteen committee was formed under the Q.M.G. to deal with the increasing business in war. The committee was an amalgamation of the earlier cooperative society and the best contracting firms, and a number of officers were detailed to act as inspectors. The committee took over all army canteens in the U.K., and a branch organization, the Expeditionary Force Canteen committee, became responsible for canteens in France, Egypt, etc.

In 1917 the Royal Navy, which until then had employed private contractors to run its canteens, asked to be included in the army organization: the name was changed to the Navy and Army Canteen Board. Canteen committee activities were separated from the inspection department under

the Q.M.G. By 1918 the Board was conducting 4,000 canteens at home and overseas, and employing nearly 50,000 men and women. After the war, when the board had accumulated £7,000,000 in profits, a central authority was created to dispose of this. £1,500,000 was to be made available for the installation of clubs in towns and villages, and the laying out of playing fields. Eventually, a government committee recommended the formation of a permanent canteen organization for the three services in peace and war, which would be run on cooperative principles. The outcome was the inauguration in 1921 of the Navy, Army, and Air Force Institutes, commonly known as Naafi (*pron. Naffy*).

Naafi's main functions are to conduct canteens at home and overseas and in H.M. ships; to supply a proportion of the messing items required by the services in Great Britain; and to provide entertainment through Ensa (*g.v.*). In peace-time Naafi provided canteens at all the principal naval ports and army camps.

In 1939 the Expeditionary Force Institutes, Naafi's overseas section, was able to send contingents overseas with the forces. Naafi canteens were organized in all

theatres except the Far East, male overseas staff being enlisted in the R.A.S.C. and women in the A.T.S., while members of the Naval Canteen Services, enrolled in the Royal Navy, conducted canteens in ships. In Great Britain, thousands of canteens were established in ports, camps, and airfields.

During the Second Great War the number of Naafi establishments increased from 600 to 8,500, and the staff from 4,000 to over 100,000. Discount allowed and rebates returned to units rose from £604,800 in 1939 to nearly £10,000,000 in 1945, while the gross turnover increased from £6,000,000 to £160,000,000. Except for necessary reserves, all profits were returned to the forces during the war in cash rebates, discounts, grants to benevolent funds, and the provision of camp amenities.

Canteen services were also maintained by the W.V.S., Y.M.C.A., Salvation Army, and other religious and charitable bodies. The Salvation Army's Red Shield canteens served in all theatres of war and mobile units provided facilities well up with the forward troops. Altogether there were 2,500 Red Shield clubs and hundreds of mobile canteens, which served over 150,000,000 cups of tea a

year. Their mobile units travelled 10,000,000 m. during 1939-45.

Canteens were run by voluntary organizations to provide meals for people in bombed areas, and special canteens were opened for civil defence workers. The American Allied War Relief Organization maintained a fleet of canteens known as Queen's Messengers to carry food to badly bombed towns. Industrial canteens were established during the Second Great War in most factories, the ministry of Labour having the power to require employers to set them up where there were more than 250 workers. By 1945 nearly 19,000 such canteens were in operation, serving approximately 8,000,000 meals a day. Works canteens received allowances of rationed foods on a scale higher than that of hotels, cafés, and restaurants.

Canterbury. Eccles. metropolis of England, city and co. bor. of Kent, co. of itself. It lies on both banks of the Stour, 55 m. by road and 62 m. by railway S.E. from London.



Canterbury arms

The cathedral, a double cruciform pile set in green lawns, was founded by S. Augustine. He converted King Ethelbert, who allowed him to set up the see in

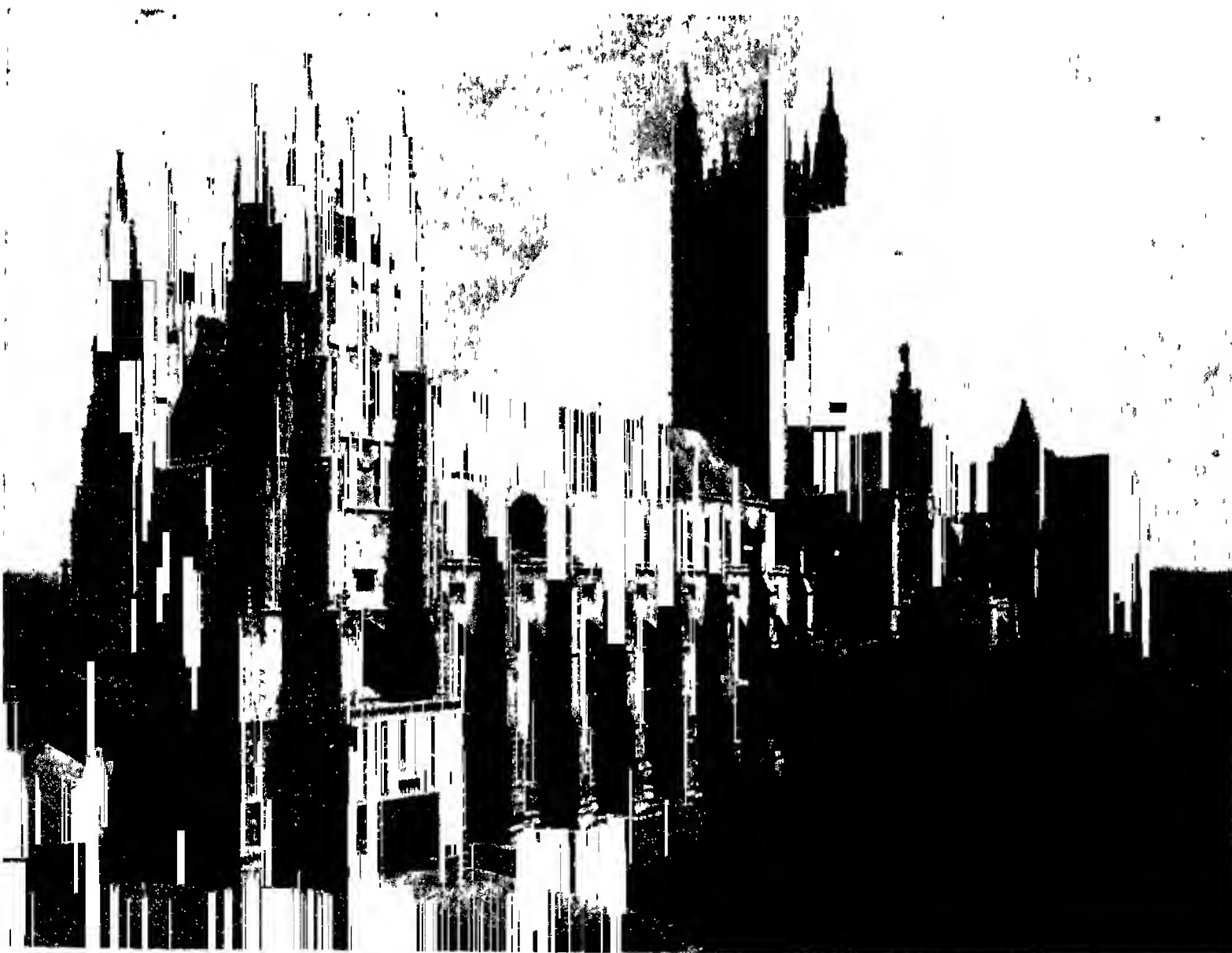
597, incorporating an existing Roman church in his new cathedral. Partly rebuilt by Archbishop Odo about 950, it was destroyed by fire in 1067 and three years later Lanfranc began the construction of an entirely new building, which Anselm carried on, and Prior Conrad finished by adding the magnificent choir. Fire demolished the choir in 1174, its reconstruction being undertaken by William of Sens, and completed by William the Englishman in 1184. Prior Chillenden erected a new nave and nave transepts in the 14th century, and the addition of the central, or Bell Harry, tower by Goldstone and Archbishop Morton about 1495 completed the building, which is an example of the architecture of many periods, the Transition-Norman and Perpendicular styles predominating.

The murder of Thomas Becket (q.v.) in the N.W. transept in 1170 and his canonisation as S. Thomas of Canterbury made the cathedral for several centuries the resort of pilgrims who worshipped at the tomb of the martyr in the crypt and from 1220 at his shrine in the Trinity Chapel. The shrine was dismantled by Henry VIII in 1538, and all traces obliterated, but in 1888 a box of bones supposedly of S. Thomas was dug up in the crypt and reinterred

there. The chapel in the crypt has been set apart for Huguenot refugees since Elizabeth I's reign. The tombs of Edward the Black Prince and Henry IV are in Trinity Chapel, and in Becket's Crown, or the Corona, the adjoining chapel, is the stone chair on which the archbishops are enthroned. Many archbishops are buried here or commemorated by monuments; the statues of six English kings are set in the choir screen. The total length of the cathedral is 522 ft., nave 214 ft., choir 180 ft.; the height of the nave is 80 ft., and breadth 71 ft.; the height of the choir 71 ft., average breadth 65 ft., its level being several steps higher than that of the nave; the central tower is 235 ft. high. The splendid Christ Church gate, built in 1517, forms an entrance to the precincts.

On the N. side of the cathedral are the cloisters, chapter house, water-tower, deanery, King's School, and libraries. The Missionary College, founded 1844, stands on the site of the ruined monastery of S. Augustine, without the city wall. Apart from the main gateway, the guest-hall, and chapel, there are many ruins of Saxon date. S. Martin's is the most notable of the fourteen parish churches; this building contains a font once said to be that wherein Augustine baptized

Ethelbert, the fourth Saxon king of Kent. In S. Dunstan's church are memorials of the Roper family; the vault contains the head of Sir Thomas More. Of interest are Roman buildings, including parts of a stone-built theatre, the ruined keep of the Norman castle, the Guildhall, and the Chequers Inn of Chaucer's *Canterbury Tales*; its "dormitory of the hundred beds" was destroyed by fire in 1865. The Beane Institute houses a museum, art gallery, and library; there are also the King's School, traditionally founded by Archbishop Lanfranc and refounded by Henry VIII, 1541,



Canterbury. The cathedral from the south-west; for more than a thousand years it has been the chief shrine of Christianity in England. The fabric suffered some damage during German air raids in 1942

the Clergy Orphan School on S. Thomas's Hill, the Simon Langton Schools, established in 1882 (which incorporated the blue-coat school founded in Elizabeth I's reign), infantry and cavalry barracks, and a corn exchange.

Silk weaving, introduced by the Walloons who settled in Canterbury in the reign of Elizabeth I, has been supplanted by other industries, *e.g.* brick-making and tanning. The Canterbury Week is a fashionable annual cricket festival, in which the Kent county eleven oppose other first-class teams.

An old British city, Canterbury was an important civilian town of the Romans, who called it Durovernum. Later, as Cantwaraburh (borough of the men of Kent), it became the capital of the Saxon kingdom of Kent. The city was ravaged and captured by the Danes during the 9th, 10th, and 11th centuries; and in 1215 Louis, prince of France, occupied the castle. The cradle of Wat Tyler's rebellion, 1381, Canterbury suffered at the hands of the Parliamentarians during the Civil War, 1642-48. The city, which returned one M.P. 1885-1918, gives its name to a county constituency. Market day, Sat. and Mon. Pop. (1951) 27,778.

Canterbury was considerably damaged during the Second Great War. German aircraft made their first big raid on the night of May 31, 1942. This was a reprisal for the 1,000-bomber attack on Cologne the previous day, and for a week enemy planes attacked the city. There was heavy damage to the S. George's St. district, Burgate St., Butchery Lane, Rose Lane, and Watling St. A daylight raid on Oct. 31 caused many fatal casualties. Despite concentrated attacks, the cathedral was only

superficially damaged. Although its library was destroyed, much of the contents was saved. Historic buildings destroyed or severely damaged included Marlowe's house, S. George's church (scene of the poet's christening), sections of the city wall, S. Margaret's church, S. Augustine's Abbey, and the Royal Fountain hotel in S. Margaret's Street.

Post-war excavation established the line of the Roman walls and a good deal of the Roman street plan, and produced evidence of Belgic, Iron Age, and Neolithic settlements on the site.

Bibliography. Canterbury in the Olden Time, J. Brent, 2nd ed. 1879; Inventories of Christ Church, Canterbury, ed. J. W. Legg and W. H. St. J. Hope, 1902; Canterbury Cathedral—Then and Now, A. E. Henderson, 1938; Canterbury Cathedral Priory, R. A. L. Smith, 1943.

Canterbury. Prov. dist. of New Zealand. Occupying the east central part of South Island, it has a coastline of 200 m. It is celebrated for its sheep, reared in the vast Canterbury Plains (nearly 4,000 sq. m. in extent) lying to the E. of the Southern Alps, the largest grazing area in the dominion. Dairy-farming prospers and a large trade in wool and grain is carried on. Mt. Cook, 12,349 ft., the highest summit in New Zealand, is on the W. border. Christchurch is the capital; Lyttelton and Timaru are the chief seaports; Akaroa and Lyttelton have excellent harbours. Area 13,940 sq. m. Pop. (1951) 280,215.

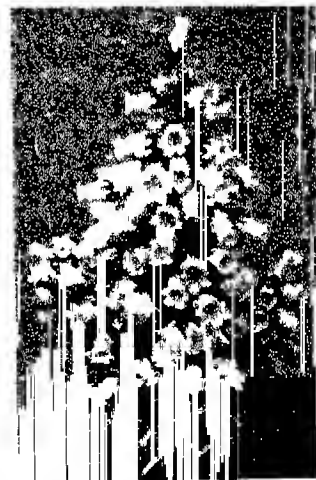
Canterbury, ARCHBISHOP OF. Chief dignitary of the Church of England. Officially designated primate of all England and metropolitan since 1353, he exercises special jurisdiction as diocesan bishop over the see of Canterbury (which during 1375-

1558 included Calais) and also supervision over the other 28 dioceses in the eccles. prov. of Canterbury. Some missionary bishoprics abroad also come under his jurisdiction. Until 1920 Wales formed part of the prov. of Canterbury (*see* Wales, Church of). The metropolitan church of the diocese of Canterbury is the cathedral built by S. Augustine about 600 on the remains of an earlier church, dating from Roman times. The archbishop of Canterbury's official residences are the Old Palace, Canterbury, and Lambeth Palace, London, S.E.1. Holders of the office used the Georgian palace at Addington, Surrey, as a country residence during 1807-96. The archbishop crowns British monarchs in Westminster Abbey, is the first peer of the realm, ranking immediately after the royal dukes in the table of precedence, and is empowered to grant degrees in divinity, law, and medicine.

The income is £7,500 a year. The see was vacant during 1645-60 (under the Commonwealth). The list below gives the 99 occupants of the see of

Canterbury since it was founded in 597, with the years of their accession. Many of them have their own entries in this Encyclopedia. Consult Lives of the Archbishops of Canterbury, W. F. Hook, 1860-84; Canterbury Administration, I. Churchill, 1933.

Canterbury Bell (*Campanula medium*). A biennial plant of the family Campanulaceae. It is about 3 ft. in height, with bell-



Canterbury Bell

ARCHBISHOPS OF CANTERBURY: A COMPLETE LIST FROM THE FOUNDATION OF THE SEE

Augustine..... 597	Odo..... 942	H. Fitz-Walter... 1193	Henry Chichele... 1414	John Potter.... 1737
Laurentius..... 604	Aelfsige 950; Brithelm	Stephen Langton... 1207	John Stafford... 1443	Thos. Herring... 1747
Mellitus..... 610	959, intruded.	Richard of	John Kemp.... 1452	Matt. Hutton... 1757
Justus..... 624	Dunstan..... 960	Wethershed... 1229	Thos. Bouchier... 1454	Thos. Secker... 1758
Honorius..... 627	Ethelgar..... 988	Edmund Rich... 1234	John Morton... 1486	F. Cornwallis... 1768
Deusdedit (1st	Sigeric..... 990	Boniface of Savoy 1245	Henry Dean.... 1501	John Moore.... 1783
English Abp.).. 655	Aelfric..... 995	Rob. Kilwardby 1273	Wm. Warham... 1503	Charles Manners
Theodore..... 668	Alphege..... 1005	John Pecham... 1279	Thos. Cranmer... 1533	Sutton..... 1805
Berchtwald..... 693	Lyfing..... 1013	Rob. Winchelsey 1294	Reginald Pole... 1556	William Howley 1828
Tatwin..... 731	Ethelnoth..... 1020	Walter Reynolds 1313	Matt. Parker... 1559	John B. Sumner 1848
Nothelm..... 735	Eadsige..... 1038	Simon Mepham... 1328	Edm. Grindal... 1576	Chas. T. Longley 1862
Cuthbert..... 740	Robert of	John Stratford... 1333	John Whitgift... 1583	Arch. Campbell
Bregwin..... 761	Jumièges.... 1051	T. Bradwardine... 1349	Richd. Bancroft 1604	Tait..... 1868
Jaenberht..... 765	Stigand..... 1052	Simon Islip.... 1349	George Abbot... 1611	Ed. White Benson 1883
Ethelhard..... 793	Lanfranc..... 1070	Simon Langham 1366	Wm. Laud (ex.	Fredk. Temple... 1896
Wulfred..... 805	Anselm..... 1093	Wm. Wittlesley 1368	1645)..... 1633	Randall Thomas
Feologild..... 832	Ralph d'Escures 1114	Simon Sudbury... 1375	William Juxon... 1660	Davidson.... 1903
Ceolnoth..... 833	Wm. de Corbell 1123	Wm. Courtenay... 1381	Gilbert Sheldon 1663	Cosmo Gordon
Ethelred..... 870	Theobald..... 1139	Thomas Arundel 1396	Wm. Sancroft... 1678	Lang..... 1928
Plegmund..... 890	Thomas Becket 1162	Roger Walden... 1398	John Tillotson... 1691	William Temple 1942
Athelm..... 914	Richard..... 1174	Thomas Arundel	Thomas Tenison 1695	Geoffrey Francis
Wulfhelm..... 923	Baldwin..... 1185	(restored).... 1399	William Wake... 1716	Fisher..... 1945



Canterbury Tales. William Blake's famous picture illustrating the prologue to Chaucer's poems. From left to right, the mounted characters are : Reeve, Chaucer, Clerk of Oxford, Miller, Wife of Bath, Merchant, Parson, Man of Law, Plowman, Physician, Franklin, Two Citizens, Shipman, The Host, Sompnour, Manciple, Pardoner, Monk, Friar, A Citizen, Lady Abbess, Nun, Three Priests, Squire's Yeoman, Knight, Squire

like blossoms, white, blue, rose, or lavender in colour. Originally a native of S. Europe, and introduced to English gardens before the end of the 16th century, it thrives in beds or borders in any ordinary garden soil, and looks well at the edge of a shrubbery. Seed should be sown in the open air in June, and the young plants placed in their permanent positions in the autumn. They will then flower freely during the following summer.

Canterbury Tales, THE. Series of twenty-five tales and prologues, all but two of them in verse, written by Geoffrey Chaucer in the closing years of the 14th century, and published by Caxton c. 1478. The tales are supposed to have been told by various members of a company of pilgrims—a knight, a prioress, a reeve, a pardoner, a squire, Chaucer himself, and others—during the journey from Southwark to the shrine of S. Thomas at Canterbury. Some of the subjects were borrowed from Boccaccio and other authors. See Chaucer.

Cantharides (*Lytta vesicatoria*) OR SPANISH FLY. Beetle about $\frac{3}{4}$ in. in length, of a bright, metallic, coppery-green colour. Also a drug prepared from the dried bodies of beetles of the family Cantharidae or Meloidae, in particular the Spanish Fly. The active principle in this drug is a crystalline substance called cantharidin which is used on account of its blistering properties. It is intended for external use only; taken internally preparations containing the drug are poisonous.

Canticles. Common name for the book of the O.T. called in the Vulgate *Canticum Canticorum*. The English translation of the Hebrew title is "The Song of Songs,

which is Solomon's." Song of Songs may mean the choicest song (a Hebrew mode of expressing the superlative idea), or a song composed of a number of other songs. The language of the book shows peculiarities which suggest either a North Palestinian origin or post-exilic influences. In the latter case the ascription to Solomon would be due to an editor, and the book itself would seem to belong to the 3rd century B.C.

The theme of the book is the mutual love of husband and bride, the former being represented by King Solomon and the latter by a Shulamite maiden. To Jewish and early and medieval expositors this theme was far from pleasing, and the book was explained allegorically or mystically as the love of God for Israel, or for the Church, or for the individual soul. Indeed, the claim of the book to a place in the Hebrew Canon was discussed freely by the rabbis, and was conceded only on the understanding that the language was not interpreted literally.

When, as often in modern times, the book is interpreted literally, it is regarded either as a collection of love-songs (so Herder), or as a series of scenes in a kind of drama.

Cantilever. Beam of which one end is unsupported and the other end is held fixed in position and direction by constraining forces. The cantilever is much used in bridge construction, e.g. the Forth Bridge, with its central and shore cantilevers.

Cantlie, SIR JAMES (1851–1926). British surgeon. Born in Scotland, Jan. 17, 1851, he graduated at Aberdeen university, and afterwards studied at Charing Cross Hospital, London. He went to China in 1887, and was dean of the college of medicine for Chinese,

1889–96, subsequently visiting the medical schools of India. The author of many works on surgery and tropical sickness, he was the founder of The Journal of Tropical Medicine and lecturer on surgery to the London School of Tropical Medicine. He was knighted, 1918, and died May 28, 1926. Consult Life, N. Cantlie & G. Seaver, 1939.

Canto (Lat. *cantus*, singing). Name sometimes given by poets, especially the romantics, to the divisions of a long narrative poem, e.g. in Byron's *Childe Harold's Pilgrimage* and Scott's *Marmion*. Byron's *Don Juan* has 16 cantos.

Canto Fermo (Lat. *cantus firmus*). Musical term for (1) plain-song; (2) the fixed part, usually moving in semibreves, above or below which counterpoints are written. See Counterpoint; Plainsong.

Canton (Fr., corner). In heraldry, a rectangular portion of the upper part of a shield. It should occupy one-third the space of a chief, and be placed to the dexter side, unless otherwise specified. It is a diminutive of the quarter, and is often



Canton in heraldry

employed to display an augmentation, or a badge of office or dignity.

Canton. Name for a territorial division in Switzerland and France. In Switzerland the cantons are the states of the federation, and have been so called since medieval times, but in France the word is used for a much smaller area, ranking between the arrondissement and the commune. Each arrondissement is divided into cantons, each of which has its magistrate (*juge de paix*) and

sends a member to the council of the arrondissement. There are about 3,000 cantons in France.

Canton (Chinese, Sheng-cheng or Kwang-chow-fu). City of China, the capital of the prov. of Kwang-tung. Situated on the Chu-kiang or Canton river, 80 m. from its mouth, it is the chief commercial city of southern China after Hong-Kong. The city used to be surrounded by a wall 6 m. in circumference, an inner wall separating the old and new portions, and along both banks of the river extend its suburbs, at the S.W. end of which, on the S. side of the river, in the European quarter. Much of these walls, however, perished in civil wars.

The city contained upwards of 120 temples and two pagodas—the plain pagoda, a Mahomedan mosque 160 ft. high dating from the 9th century, and another, a 6th century octagonal nine-storeyed structure 170 ft. high. Many of these buildings, and others in Canton, were damaged or destroyed during the China-Japan conflict, 1937–45. A feature of the city is the number of boats on the river, which are used as permanent residences. Canton has a fairly healthy climate, the temperature ranging between 40° and 98° F., and the rainfall averaging about 70 ins. per annum. The pop. perhaps exceeds 1,500,000.

An extensive trade is carried on, although the development of Shanghai has curtailed it somewhat, while the shallowness of the harbour is also a drawback. Large vessels discharge at Whampoa, 10 m. below Canton, their cargoes being carried by lighters. The principal exports are silk and matting, and the leading imports

raw cotton, cotton and woollen goods, and petroleum. Among manufactured products are fire-works, silk and woollen articles.

More than 2,000 years ago the site was known as Nam Mo Shing. It became a market for foreign produce, frequented by merchants from India, about A.D. 700. The Portuguese opened trade with Canton 1518. English ships followed in 1637, and in 1684 the East India Company established a factory here. In 1757 Canton was made the sole port in China for foreign trade. It was captured by British troops in the war of 1840–42, and again in 1857 in conjunction with the French. Foreign occupation was maintained until 1869.

In the last years of the Manchu dynasty Canton was the home of revolutionary conspiracies, some of them engineered by Sun Yat-sen, and after the revolution of 1911 it was the seat of his government. It became the base of the Chinese nationalist movement, which set out hence in 1926 to unify China. During the China-Japan conflict, Canton was heavily bombed in 1937 and in May–June, 1938, the water supply, power station, and rlys. being seriously

damaged. The Japanese entered the city Oct. 21, 1938, and found its centre in ruins. In the Second Great War they seized the British concession on Dec. 8, 1941. Japanese occupation came to an end with Japan's surrender in 1945. In their subsequent conquest of China, the Communists entered Canton Oct. 14, 1949.

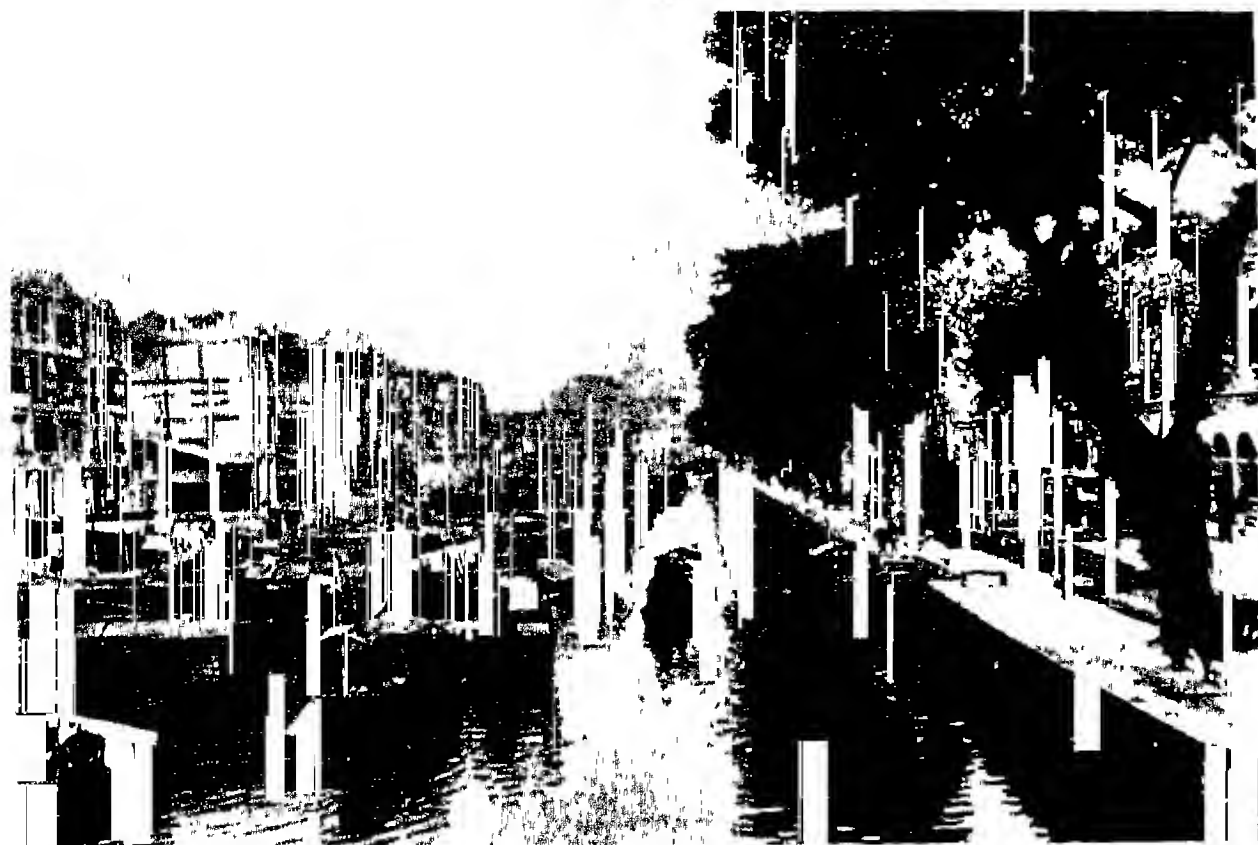
Canton. City of Illinois, U.S.A., in Fulton co. It is 27 m. S.W. of Peoria, on several rlys., and lies in a coal-mining and agricultural district. It has foundries and lumber-yards, and a plant of the International Harvester Co., and manufactures agricultural implements, motor accessories, clothing, and cigars. It was incorporated 1849. Pop. (1950) 11,927.

Canton. City of Ohio, U.S.A., the co. seat of Stark co. It is on the Nimishillen Creek, 56 m. S.S.E. of Cleveland, and is served by the Baltimore and Ohio and other rlys. Among its public buildings are the city hall, county court house, U.S. government building, Carnegie library, and city auditorium. It has a municipal airport, steel- and bridge-works, and the Timken roller-bearing works. It makes safes, vaults, and vacuum cleaners; exports coal and cereals; and the district produces wheat, coal, clay, and limestone. Canton was the home of President McKinley, who is buried here in a mausoleum modelled on the Taj Mahal and Hadrian's tomb. Canton was incorporated in 1822, and became a city in 1854. Pop. (1950) 16,912.

Canton, JOHN (1718–72). British scientist. Born at Stroud, July 31, 1718, he served his apprenticeship to a cloth weaver and then became a schoolmaster in London. At an early age he made experiments in electricity, and his discoveries included the capacity of air to receive electricity by communication. He also invented the electroscope, and a phosphorus compound luminous in the dark after exposure to sunshine. He died March 22, 1772. See Canton's Phosphorous on next page.

Canton and Enderbury. Coral atolls of the Phoenix group in the Pacific, just S. of the equator, forming part of the British colony of the Gilbert and Ellice Islands. They were put under joint British-U.S. administration for 50 years in 1939. The U.S. govt. controls the international airport on Canton.

Cantonments. Term formerly used in British India for areas permanently reserved to accommodate troops. In Europe the



Canton, China. Canal, crowded with houseboats, which separates the city from Shameen Island, the European quarter. Top picture, the City Hall

term was formerly used in the sense of billets. An army was "cantoned" in inclement seasons to avoid disturbing its military organization. *Pron.* can-toon-ments.

Canton River (Chin, Chu-kiang, the pearl river). Main channel of the Si-kiang and Pe-kiang, S. China, in the prov. of Kwang-tung. Below Canton it is called Bocca Tigris, and further S. Outer Waters. The entrance is guarded by the Bogue Forts. The estuary has many islands, on which rice is cultivated.

Canton's Phosphorus. Name given to calcium sulphide. It has the property of exhibiting luminosity in the dark after it has been exposed to strong light. John Canton, who devised his process in 1768, calcined oyster shells and sulphur together in a crucible for one hour to obtain calcium sulphide. It is known, through the researches of Becquerel, that the production of phosphorescent calcium sulphide depends upon the presence of certain impurities. Balmain's luminous paint is a form of Canton's phosphorus, but contains a trace of bismuth, which imparts a bluish colour to the luminosity.

Cantor (Lat., singer). In cathedrals and collegiate churches, the official head of the choir, or the precentor. *See* Choir.

Cantoria. Term applied in Italian architecture to a gallery or balcony designed to accommodate the singers in a church. During the Renaissance, cantorie were often ornamented with fine sculpture in relief. A famous example is the basso rilievo (*q.v.*) executed by Luca della Robbia for the cathedral at Florence, now in the Museo del Duomo. In Ferrara cathedral there are two tribunes or pulpits, which may be styled cantorie, one in the choir and the other in the nave, intended respectively for the choristers and their superiors. *See* Cathedral; Church.

Cantoris. Left-hand or north side of a cathedral or church choir, where the cantor usually has his position. In cathedrals and other churches it is customary to have a complete representation of the voice parts on each side, for antiphonal use. *See* Cathedral; Choir.

Cantù, CESARE (1801-95). Italian politician and historian. Born at Brivio, Dec. 8, 1807, he was at first a teacher, but soon began to write both prose and verse. His writings led to his imprisonment by the Austrians, then ruling Lombardy, but after a time he was released. In 1848 and afterwards he was associated with the party working for Italian freedom, and in 1859-61 he sat in the Italian parliament. From 1874 until his

death at Milan, March 11, 1895, he was director of the archives of Lombardy. Cantù wrote a universal history in 72 volumes, 1840-47, a work frequently translated, and also a History of the Italians, 1855. His works include some novels, and reminiscences of his friend Manzoni, 1883.

Cantyre. Variant spelling of the name of the peninsula in Argyllshire, Scotland, better known as Kintyre (*q.v.*).

Canuck. Term applied in the U.S.A. to a Canadian, and by British Canadians to a French Canadian. It is also a common name in Canada for a small stocky horse. The word is generally regarded as being of American Indian origin.

Canute. Christian name of Scandinavian origin. It is often spelled Cnut or Knut, especially by recent writers, and its meaning is that of a chief or noble. There have been four kings of Denmark of this name. Canute I, called the Great, was a king of England, but the later Canutes, save only Canute IV, were persons of little importance.

Canute I (c. 994-1035). King of England and Denmark. Canute the Great was the son of Sweyn Fork-beard, king of Denmark, who drove Ethelred the Redeless out of England in 1013, and was acknowledged as king by the English Witan. Sweyn died in 1014,

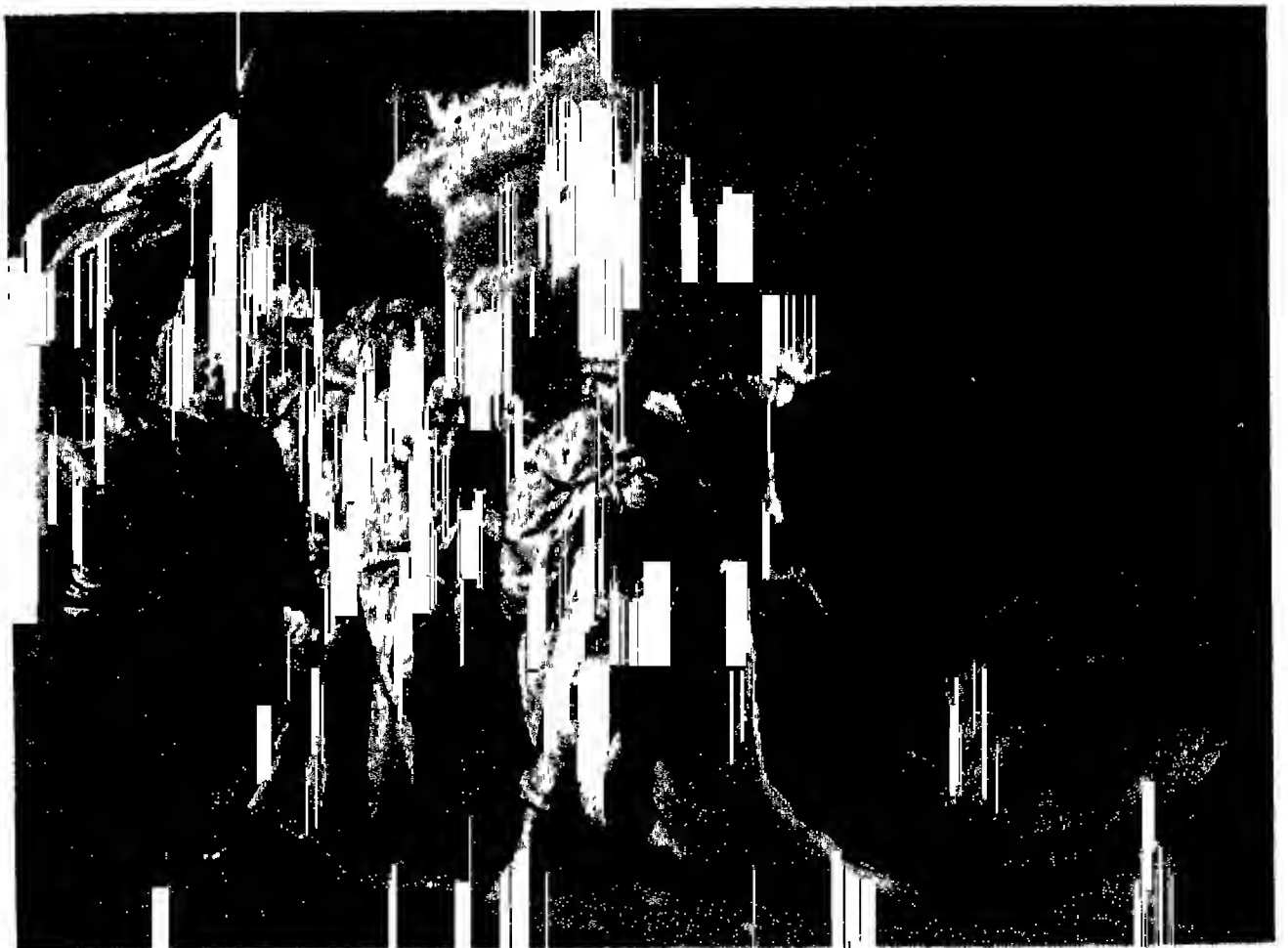


Canute I, Danish King of England

the Great was the son of Sweyn Fork-beard, king of Denmark, who drove Ethelred the Redeless out of England in 1013, and was acknowledged as king by the

and Canute, a lad of nineteen, claimed the throne. Ethelred was recalled to dispute the succession; many of the English and the Danes of the old Danelagh rallied to the standard of his valiant son, Edmund Ironside. Canute returned from Denmark, whither he had been summoned by necessities of state, 1015, and a struggle took place, so doubtful in its result that Canute and Edmund, Ethelred having died in the interval, agreed, 1016, to divide England between them. Within a few weeks of the agreement Edmund was slain, though not by Canute's orders, leaving only two infant children. Canute was then acknowledged as sole king. Edmund's brother was put to death, and the two children were sent out of the country.

Canute, who hitherto had seemed to be a mere barbarian, now suddenly showed himself an exemplary prince and an exceptionally strong and capable ruler. He was king both of Denmark and England, but he did not treat England as a conquered country. He married Emma, Ethelred's widow, sent away the Danish armies, and divided the country into five great earldoms or provinces. Law and order, which had disappeared in the reign of Ethelred, were restored. He aimed at creating a great northern empire which would include England, Denmark, and Norway, though he had a hard struggle before he could secure the Norwegian crown. Canute died at Shaftesbury, Nov. 12, 1035, and was buried at Winchester. *Consult* Canute the Great and the Rise of Danish Imperialism, L. M. Larson, new ed., 1931.



Canute reproving his courtiers for their sycophantic folly in suggesting that a word from him could stay the advancing tide

From a painting by R. E. Pine

Canute IV (d. 1086). King of Denmark, and saint. The natural son of Sweyn II, he was chosen king about 1080. He married Eltha, daughter of Count Robert of Flanders, promoted Christianity in Courland and Livonia, and endeavoured to suppress piracy. His plan for assisting the Saxons in England against William the Conqueror in 1085 was betrayed by his brother Olaf. Held responsible by the people for the misdeeds of his tax-collectors, he was slain on the island of Fyen, July 10, 1086, and was subsequently canonised as a martyr, his festival being kept on Jan. 19.

Canvas (Lat. *cannabis*, hemp). Stout fabric. Apparently canvas was originally made of hemp, but flax was an early canvas material, and other fibres are largely used, e.g. cotton and jute. Canvas is used mainly for packing purposes, tents (hence the phrase "living under canvas"), sacks, motor tires, horses' nosebags, rick and cart covers, etc. Canvas for the groundwork of tapestry and embroidery, known as "art canvas," is usually of flax, cotton, or jute.

Canvas is in almost universal use among painters in oil colours. The surface is coated with a priming, or ground of size and whiting. For fine canvases a thin coating may serve, but on coarser the priming must be laid on thicker. The back of the canvas also should be coated with an oil priming or other preparation (shellac, wax, resin, etc.) to protect it from the effects of damp walls, and then mounted on a frame, the inner edges of whose battens are rounded perfectly smooth to prevent them marking or injuring the canvas. Canvases already prepared and stretched on frames have (in normal times) a large sale among artists.

Canvas-back Duck (*Nyroca rallisneria*). Species of pochard found in N. America. The head and neck are red, and the beak is longer than the inner toe. It breeds in Canada, and only visits the U.S.A. in the winter. It is highly valued for the table for its delicate flavour. It feeds chiefly on a water plant resembling celery.

Canvassing. A political and commercial term for solicitation of votes and trade orders. In politics the word is applied to the personal soliciting of votes either by a candidate or by his representatives, and, although often deprecated as an objectionable practice, is quite legal. In business it is applied to visits systematically paid by agents to private

houses for the purpose of selling something. The word comes from canvas, the idea of canvassing being to examine anything carefully by straining it through canvas. See Bribe: Election.

Canvey Island. Urb. dist. of Essex, off the coast. It is in the Thames estuary, 30 m. E. of London, reached by railway to Benfleet. The island, which is low and marshy, was reclaimed from the sea in the 17th century by a Dutchman, and in its natural features closely resembles Holland. It is protected by embankments, and there is communication by a road bridge with S. Benfleet. The island is a coastal resort. Pop. (1951) 11,255.

Canzona (Ital., song). In music: (1) concerted music for voices, in the madrigal style; (2) Instrumental music of similar type. Sonatas of the 10th century frequently contained a movement of this kind, the parts being more or less in imitation. The canzona anticipated the fugue (*q.v.*).

Canzone. Form of Provençal and Italian lyric poetry developed from the canzo or love-song of the troubadours. It consists of a series of stanzas, usually five or six, concluding with a shorter stanza called the Envoi. Generally, each stanza contains 14 lines, and in respect of this and of the rhyme-scheme, the canzone is an irregular form of sonnet. Dante, Petrarch, and Leopardi are the great Italian masters of the canzone. In English the form has been used with supreme success by Drummond of Hawthornden, who perhaps introduced it into England, and by D. G. Rossetti.

Canzonet. Musical term of various meanings. (1) Diminutive of canzona. (2) Vocal solo of some length, in more than one movement (17th to 18th century). (3) Songs of lighter type than (2), such as Haydn's *My Mother bids me bind my hair*. (4) Instrumental movement of similar light type.

Caoutchouc. This American-Indian word is a synonym for rubber (*q.v.*) and, in mineralogy, for elaterite (*q.v.*).

Cap (Lat. *cappa*). Close-fitting covering for the head. The general difference between a hat and a cap is that the hat has a brim, while the cap has not.

The Roman pileus, an early form of cap, was almost identical with the pilos of the Greeks. In England caps were worn at a very early date, some of them being of costly material. Kings are represented with them on their heads,

and by an Act of Parliament of 1571 all men and boys over six years of age, the upper classes excepted, were ordered to wear the city flat cap or statute cap of wool on Sundays and holidays. This developed into the peaked cap, made both of woollen and of cotton cloth, so popular in Britain.

Other forms of cap are the mob-cap, formerly worn by domestic servants, the biretta (*q.v.*) or square cap of the priest and the French advocate, the black cap of the judge, the bishop's cap of Anglican prelates, the king's cap of maintenance (*q.v.*), and the skull-cap, long associated with astrologers and magicians.

The college cap, vulgarly known as "mortar-board," is an academic head-dress, worn by graduates, undergraduates, and certain school boys, and is evolved, as are the biretta and bishop's cap, from an early soft square cap.

In military regulations the term cap is used for the head-dress of soldiers' full-dress uniform which does not include a helmet, busby, shako, or bonnet. There are the square lancer cap for lancer regiments, the bearskin cap of the dragoons, Royal Engineers, Royal Artillery, and Foot Guards, and the sealskin cap of fusiliers. The state uniform of the bands of the Horse Guards and the drum majors of the Foot Guards' bands include a blue velvet jockey cap.

In 1939 the peaked khaki cap worn with field service dress was replaced by a folding khaki forage cap of the glengarry type; the flap could be unfolded to protect the ears. A similar cap, but in blue, was issued to the R.A.F. In 1943 a khaki beret was issued to many men in the army in place of the forage cap; it was similar to the black beret worn by the Royal Armoured Corps, the green beret of Commando units, and the maroon beret of airborne troops. In 1946, dark blue berets were issued to all infantry regts. and certain corps. The blue forage cap of the R.A.F. regiment was replaced by a blue beret in 1944, issued to all branches of the R.A.F. in 1948. The peaked cap of the Army and R.A.F. continued to be worn by officers on official occasions, and the peaked service cap was also retained by the Guards, military police, and R.A.F. police and motor drivers. In the Royal Navy ratings wear a flat blue cap without a peak, while officers and petty-officers wear the peaked cap. See col. plate facing p. 1705.

Capablanca, José RAOUL (1888-1942). Cuban chess player. Born at Havana, Nov. 19, 1888,



José Capablanca,
Cuban chess player

he was a boy prodigy at the game. Having beaten the island champion when 12 years old, he studied at Columbia University, N.Y., and in 1909 defeated the U.S. chess champion Marshall. At San Sebastian in 1911 he won an international tournament, Lasker, then world champion, being absent. The latter succeeded, after a struggle, in beating Capablanca at St. Petersburg in 1914, but in 1921 an official challenge match was won easily by the Cuban. He lost his world title to Alekhine in 1927, but still excelled at tournaments, tying with Botvinnik for first place at Moscow in 1935 and Nottingham in 1936. One of the most incisive and logical players known to the game, Capablanca was by profession a diplomatist and was a Cuban attaché in the U.S.A. when he died in New York, March 8, 1942. His book *Chess Fundamentals* appeared in England that month.

Capacitance. Term in electrical engineering. Formerly called capacity, it is: (i) the property of a conducting body to which a quantity of electricity has to be imparted to produce a difference of potential (voltage) between it and surrounding bodies; (ii) the ratio of the charge on a conductor to its potential, when all the neighbouring conductors are at zero potential; (iii) the ratio of the electric charge on the plates of a capacitor (*v.i.*) to the potential difference between them; (iv) the ratio of a circuit element at a given frequency, the quotient of the susceptance, divided by the frequency multiplied by 2π . The symbol of capacitance is C , and it is measured in farads. Capacitance is a property inherent in all electrical circuits, but in many its effect is negligible; in others it can be an advantage or a disadvantage. Capacitance can be introduced by the use of a capacitor.

Capacitor. Device for storing electrical energy, as electric stress in a dielectric (or insulating material), and for introducing capacitance into a circuit. Such devices were once called condensers.

Basically, a capacitor consists of closely spaced conducting surfaces

(called plates or electrodes), separated by air, oil, glass, mica, waxed paper, or other dielectric.

Action. When two plates separated by air are connected to a D.C. current, one plate acquires a positive charge of electricity and the other a negative charge. The flow of electrons from the positive to the negative plates continues until equilibrium is reached, and the passage of current ceases. The capacitor is then fully charged.

The charges of opposite polarity on the plates establishes an electric field between them. If instead of an air space a material dielectric, gas liquid or solid, is placed between the plates, the field "stretches" or "rotates" the molecules of the dielectric and places it under strain, thereby increasing the charge on the plates, and therefore the capacitor's capacitance. Capacitance is directly proportional to the charge and indirectly to the voltage (*i.e.* $C = \frac{Q}{V}$, where Q = Charge; V = Voltage; C = Capacitance).

When the supply current is disconnected, the capacitor remains charged until the plates are connected externally, or the charge has dissipated by leakage.

If joined to an A.C. supply the plates are alternately given positive and negative charges, but there is still a transfer of electrons between them to induce a current in the external circuit.

Capacitance. The capacitance (or capacity) of a capacitor depends on: (i) the area of the plates; (ii) their configuration; (iii) their distance apart; (iv) the nature of the dielectric. It varies directly as (i) and inversely as (iii): the larger the total area of the plates, and the closer they are together, the higher the capacitance. Furthermore, it varies directly as the permittivity of the dielectric. For vacua (or air) this is 1, for other dielectrics somewhat higher. So that for a given plate space and separation, glass gives approximately six times the capacitance obtained with air; oil, 2; wax, 2; and mica, 7, approx. The shape and configuration of the plates or electrodes is also important: whether they are parallel plates, concentric cylinders, opposed spheres, etc. In variable capacitors the distance between plates may be varied or there may be one set of fixed and one of movable plates, so that the area of plates juxtaposed is varied.

The practical unit of capacitance is the farad, but this is too large

for most purposes. The microfarad (μF), and micro-microfarad ($\mu\mu F$), one millionth and one billionth part of a farad respectively, are more generally used.

Capacitors can be connected in series or parallel. In parallel, the total capacitance is the sum of their separate capacitances. In series the total capacitance is the sum of their reciprocals; *i.e.* $\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$, etc., so that the total capacitance is less than that of the smallest unit. Considering three capacitors of 1, $\frac{1}{2}$, and $\frac{1}{3}$ microfarad respectively, their capacitance in parallel would be $1 + \frac{1}{2} + \frac{1}{3} = 1\frac{5}{6} \mu F$. In series their capacitance would be:

$$\frac{1}{C} = \frac{1}{1} + \frac{2}{1} + \frac{4}{1} \text{ or } \frac{1}{C} = 7,$$

from which $C = \frac{1}{7} \mu F$.

Applications. The chief applications of capacitors are in radio, television, and electronic equipment. In a circuit containing both inductance and capacitance, the values of the components may be so chosen that the effects of the two exactly neutralise one another at a given frequency; the circuit is then said to be resonant. Under these conditions, with the components connected in series, the current is limited only by the resistance of the circuit, and may be very large, and the voltages across the inductor and capacitor (equal and opposite) may greatly exceed the voltage across the circuit as a whole. With a parallel connexion, theoretically infinite opposition is offered to a current at the resonant frequency. By applying these principles, circuits can be designed to accept certain frequencies and reject others, to permit oscillations, to allow a set to be "tuned" to a given frequency or wavelength, or to prevent the unwanted flow of D.C.

For controlling the time base of a cathode ray tube, a capacitor is used in conjunction with a valve circuit, advantage being taken of the fact that it takes a finite though small time to charge a capacitor. Capacitors are also an integral part of interference suppressors, and are used for power factor correction, for surge protection, in impulse generators, potential dividers, capacitor transformers, and capacitor motors.

Capacity. Term with various meanings in technology. In electrical engineering: (i) the rated making or breaking current and the rated service voltage of a

switch or circuit-breaker; (ii) the maximum current carried by a fuse before blowing; (iii) obsolete term for capacitance; (iv) obsolete term for the designed output of an electrical machine or transformer. In automobile engineering, the cubic capacity or volume of an engine cylinder and therefore an index of the power developed. In aeronautics, the cubic gas capacity of a balloon or airship envelope.

Capacity. In English law, the ability to affect one's legal position by doing certain acts or to hold an office or exercise a right. The qualities that most usually produce legal incapacity are insanity and lack of age. An insane person is in general totally incapacitated—*e.g.* he cannot contract, or commit a crime. Persons under eight cannot commit a crime, those under 16 cannot marry, and those under 21 cannot vote or in general contract or make a will. Up to 1919 sex was a ground of incapacity to hold many offices, and after the general incapacity was abolished a peeress in her own right still remained incapable of sitting in the house of lords. The contractual capacity of registered companies is also limited.

The distinction should be noted between acts which a person has not the legal capacity to do and acts which it is merely illegal for him to do. Thus a person under 16 has not the capacity to marry, and if he goes through a marriage ceremony his doing so has no legal effect on his status and there is no marriage; on the other hand it is in general illegal for a person under 21 to marry without the consent of his parents, but a person between 16 and 21 has nevertheless the capacity to marry, and if he goes through a marriage ceremony without his parents' consent, he may be prosecuted and fined, but the marriage is valid.

Capaneus. In Greek legend, son of Hipponous, one of The Seven Against Thebes. Zeus struck him dead by lightning as he was scaling the walls of Thebes.

Cap Bon. Headland of Tunisia, North Africa, about 50 m. N.E. of Tunis. It was the site of the last stand in Africa by Axis forces in the Second Great War. See North Africa Campaigns.

Cape Breton. Island at the N.E. extremity of Nova Scotia, Canada. Politically part of the prov., it is separated from the mainland by the Gut of Canso; it has an area of 3,970 sq. m. Its coast is deeply indented by bays, forming in many instances good



Cape Coast. General view from the lighthouse of this seaport of Ghana (Gold Coast), showing the Castle on the water front

harbours, of which the chief are Aspey, St. Ann's, Sydney (one of the best in Canada), Louisburg, Gabarus, and St. Peter's. Bras d'Or Lake, really an irregular gulf penetrating from the E. coast, almost divides the island into two portions, and the severance is completed by the navigable St. Peter's Canal, which cuts through to the Gut of Canso. Several low hill ridges relieve the surface of the interior, which in the N. attains a height of 1,800 ft.

Cape Breton enjoys a mild but somewhat moist climate, and presents a variety of pleasing scenery which attracts many tourists. Coal is mined in great quantities, and limestone, slate, and marble are quarried; while lumbering and the coast and lake fisheries (cod, herring, mackerel) are flourishing branches of industry. The ship-building industry at Sydney, greatly developed during the Second Great War, declined after it. Communication is afforded by the Canadian National (terminus at Sydney, the chief town on the E. coast) and other rlys. Pop. (1951) 157,690, most of whom are of Scottish descent, some still using the Gaelic tongue.

Granted to France by the peace of St. Germain of 1632, the island became the headquarters of the French who migrated or were exiled from Newfoundland and Nova Scotia after the treaty of Utrecht, 1713. Twice captured by the British, to whom it was finally ceded in 1763, it was definitely annexed to Nova Scotia in 1820.

Cape Coast. Seaport of Ghana (Gold Coast), W. Africa. Situated 80 m. W.S.W. of Accra, it is in the Western Region, of which it is the administrative h.q. There is no natural harbour, vessels anchoring in the open roadstead and loading and discharging cargo by surf boat. The town is connected by road with Takoradi and Accra, and with the Northern Territories through Kumasi. It has govt.

water and electricity supplies, and housing estates have been developed under a town planning scheme. A citrus-growing industry is centred near Cape Coast, and lime fruit and juice are exported, as also are palm oil and timber. Much of the catch from the valuable fisheries is cured and sent to inland markets. Goldworking is an important local craft.

Cape Coast was first settled by the Dutch in 1595 and taken by the Portuguese in 1610. The settlement was sold to the Swedes in 1652, who built Cape Coast Castle, the white walls of which still dominate the waterfront of the town. Surrendered to the Dutch, 1659, the fortress was taken in 1664 by the British who maintained it as their h.q. on the Gold Coast until the seat of govt. was removed to Accra in 1876. Pop. (1948) 22,346.

Cape Cod. Curved peninsula of Massachusetts, U.S.A. Shaped like an irregular letter L, it forms a S.E. extension of the state and separates Cape Cod Bay from Nantucket Sound. About 65 m. long and from 1 m. to 10 m. broad, it is served by rly., and contains a number of good harbours and several health resorts. Its outline is continuously being modified by the varying set of currents. A canal at its W. end which connects Barnstable and Buzzard's bays is 8 m. long, has a mean low-water depth of 27 ft., and saves about 75 m. on a journey from Long Island Sound to Boston. Consult *The Outermost House*, H. Beston, 1929.

Cape Cod Bay. Inlet of Massachusetts, U.S.A. It is formed by Cape Cod peninsula. On a W. arm stands Plymouth, where the Pilgrim Fathers (*q.v.*) landed in 1620.

Cape Colony. Old name of the area which became the province of the Cape of Good Hope in the Union of S. Africa. See Cape of Good Hope Province.

Cape Fear. River of North Carolina, U.S.A. Rising in the

N. of the state, it flows about 300 m. S.E. to the Atlantic. It is navigable for half of its course.

Cape Figwort (*Phygellus capensis*). Shrub belonging to the family Scrophulariaceae. A native of S. Africa, it has opposite, long, oval leaves, and showy, scarlet tubular flowers which hang from short lateral branches.

Cape Gooseberry (*Physalis peruviana*, from the Gr. *physis*, a bladder). Perennial herb of the family Solanaceae. A native of S. America, it has become naturalised in S. Africa and other warm countries. It grows erectly to the height of 3 ft. and has downy heart-shaped leaves. The flowers are whitish, with spotted corolla, violet anthers, and the calyx much inflated so that it resembles a bladder. This remains, when the corolla has fallen, to protect the edible globular pale gold fruit. The plant is grown in gardens in the U.K. for decorative purposes. The allied *P. alkekengi*, an Asiatic species, is called the winter cherry on account of its red fruit.

Cape Haitien. Seaport on the N. coast of Haiti, W. Indies, 89 m. N. of Port-au-Prince. It has a good anchorage where ships unload from lighters. It was so flourishing under French rule that it was called the Paris of Haiti. An earthquake in 1842, a British bombardment in 1865 severely damaged it; but it remains a busy port exporting coffee, timber, and hides. Pop. (1950) 24,957.

Cape Horn. This most southerly point of S. America is described under Horn, Cape.

Cape Hunting Dog (*Lycan pictus*). Aberrant member of the dog family, found only in S. and E. Africa. Somewhat resembling a long-tailed hyaena, its coat is blotched with black, white, and yellow. It hunts in packs, and can easily run down antelopes.

Capek. Name of two brothers, Czech dramatists and novelists. Karel (1890-1938) became world-famous through his expressionist play *R.U.R.* or *Rossum's Universal Robots*, produced in London, 1923. (See *Robot*.) With *The Insect Play*, written in collaboration with his brother Josef (1887-1945) and produced in London the same year, he in-

creased his reputation as a dramatist of originality. Another play, *Power and Glory*, was performed in London, 1938. His novels showed traces of the influence of H. G. Wells, e.g. *The Absolute at Large*, 1927; *Money*, 1929; *Hordubal*, 1934; *An Ordinary Life*, 1936; *War with the Newts*, 1937. He also wrote a series of witty travel books. Josef wrote a number of novels, supplied drawings for his brother's books, and designed settings for the plays. He died as the result of imprisonment in a German concentration camp. *Pron.* chap-ek.

Capel, ARTHUR CAPEL, BARON (c. 1610-49). English royalist. Elected member for Hertfordshire in the Short Parliament and the Long Parliament of 1640, he became one of the most devoted adherents of Charles I. In 1641 he was created Baron Capel of Hadham, Herts. He fought for the king during the Civil War, escorted the queen to Paris, helped Charles to escape from Hampton Court, and in Aug., 1648, surrendered to Fairfax at Colchester. He escaped from the Tower, but was retaken and beheaded at Westminster, March 9, 1649. The inscription on his tomb states he was "murdered for his loyalty."

His eldest son Arthur (1631-83) was created earl of Essex, 1661. Lord-lieutenant of Ireland, 1672-77, as the friend of Sidney and Russell he was arrested on the discovery of the Rye House Plot. He was found dead in the Tower, July 13, 1683, the evidence suggesting suicide. From him the present earl of Essex is descended.

Capel, THOMAS JOHN (1836-1911). British R.C. prelate. Born in Ireland, he was ordained by Cardinal Wiseman in 1860. From 1868, when he received the 3rd marquess of Bute into the Roman Catholic Church, until 1882, when he was suspended by Cardinal Manning from officiating in Westminster, Mgr. Capel was a prominent figure in London and a popular preacher. Disraeli drew



Cape Hunting Dog, a savage dog which is notable for its speed

him in *Lothair* as Mgr. Catesby. As rector of the College of Higher Studies, Kensington, which became hopelessly insolvent, and as founder of a Catholic public school at Kensington, which was bankrupt for £28,000, Capel was held

by Manning to have failed. In 1883 Capel migrated to the U.S.A., where he continued active as priest, preacher, and lecturer until his death, Oct. 23, 1911.

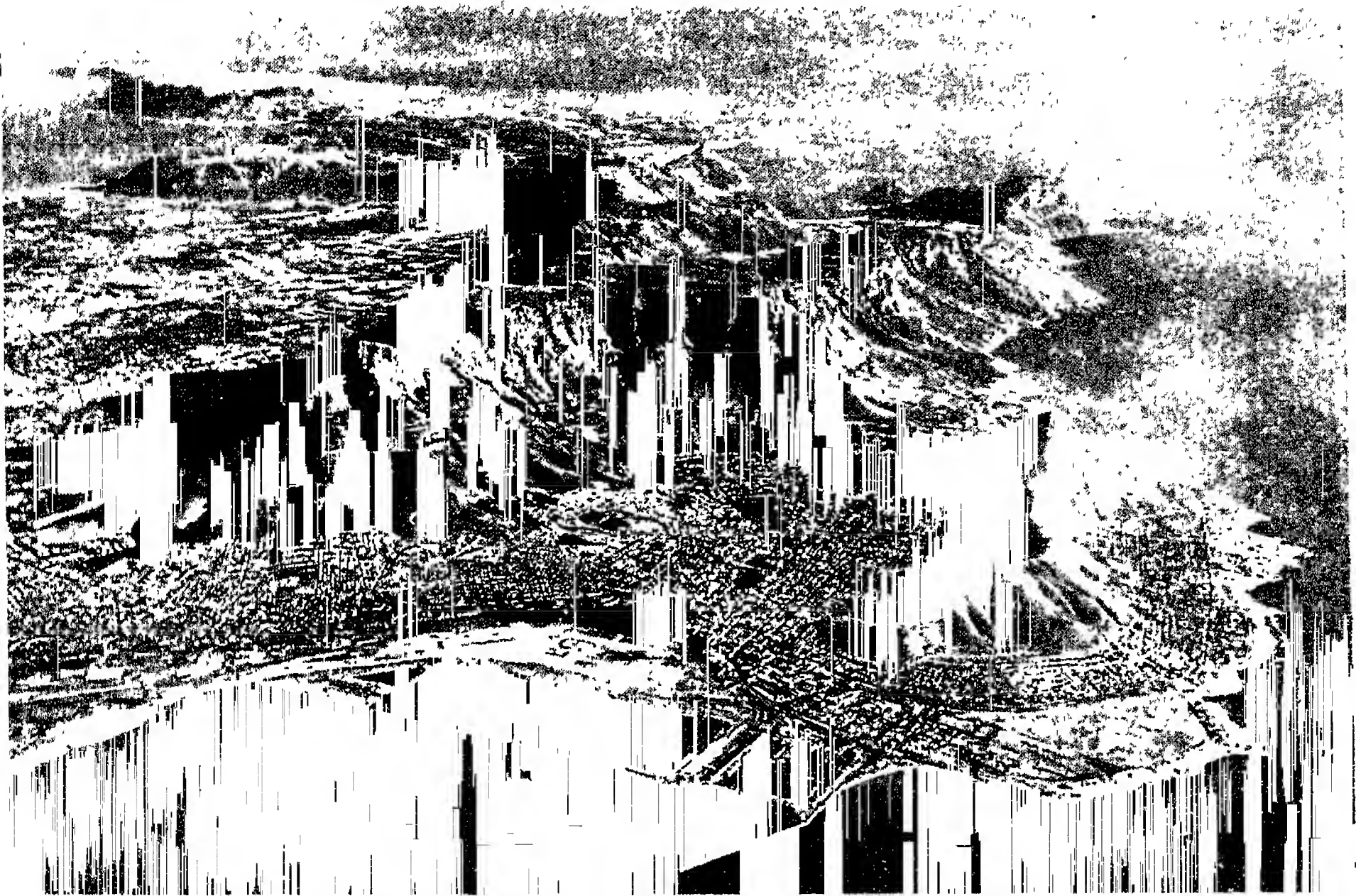
Capel Curig. Parish and hamlet of Carnarvonshire, Wales. It is 6 m. W. by N. of Bettws-y-Coed, near the confluence of the Gwryd with the Llugwy, and is a tourist and fishing centre, also frequented by artists, botanists, and geologists. There are an old and a modern church.

Capella (Lat., goat). One of the three brightest stars in the northern sky, also called Alpha Aurigae. It is a double star, lines due to both components being visible in the spectrum. The light is about 120 times as great as that of the sun.

Capelle, JAN VAN DER (1624-79). Dutch painter and collector. Born at Amsterdam, where his father was a dyer, he amassed a large fortune in the same trade. Several of his paintings, which are mainly confined to seascapes and marine objects, are in the National Gallery, London. He died in Amsterdam, Dec. 22, 1679.

Cape of Good Hope. The S.W. extremity of Africa, with its famous landmark, Table Mountain. On the E. is False Bay and on the N. Table Bay. The cape itself, which terminates the peninsula, was discovered and doubled by the Portuguese voyager, Dias de Novaes, in 1488, and was first called Cabo Tormentoso, or Cape of Storms, but renamed Cabo da Boa Esperanza by John II of Portugal. The name has been given to the whole district around the cape.

Cape of Good Hope Province (formerly Cape Colony). Province of the Union of South Africa, in short, the Cape Province. Its coastline extends for over 1,300 m. from the mouth of the Orange or Gariep river on the W. to that of the UmTamvuna on the E. Inland its boundaries are the territory of South-West Africa, Bechuanaland protectorate, the Transvaal, Orange Free State, Basutoland, and Natal. The Orange river separates it from the territory of South-West Africa, and the Molopo river forms a natural division between it and the Bechuanaland protectorate. Its area is 277,113 sq. m., its breadth N.W. to S.E. about 800 m., and its length almost the same. Cape Town is the capital, Port Elizabeth being the next town in size. The pop. in 1951 was 4,378,078 of whom 926,948 were



Cape of Good Hope. Aerial view of the Cape, showing Table Mountain in the middle distance, Cape Town lying between it and the long, pointed ridge known as the Lion's Head, and suburbs between the latter and the sea

white. In the coloured element, Cape Coloureds and people of Bantu speech predominate. Between 1865 and 1891 the pop. rose from half a million to 1½ millions.

The Cape Province consists of the former Cape Colony and certain territories added to it. These include Pondoland in 1894, and parts of Bechuanaland in 1895. Other territories are East Griqualand and Tembuland. Walvis Bay is a small, detached area lying N. of the Orange river.

The E. coast is almost without indentation, but on the S. and W. shores several bays occur, the chief being Algoa Bay, St. Francis Bay, Mossel Bay, False Bay, Table Bay, Saldanha Bay, and St. Helena Bay. The prov. has few good harbours. The Cape of Good Hope, Cape Point, and Cape Agulhas, are the main headlands. From the coast the land rises in a series of terraces. The flat coastal region soon gives place to the hills that lead to the plateau known as the Little Karroo, beyond which is the Great Karroo, another plateau about 350 m. long. Beyond this are the mountain ranges which, under various names, form a curve round the prov., and of which the Drakensberg or Kwathlamba range

is the easternmost. Through these are passes to the great tableland of South Africa, much of which is in the prov. The highest point is Compass Berg, 8,200 ft., in the Sneeuwberg range, and there are several other peaks above 7,000 ft.

The great rivers of the prov. are the Orange and its tributary, the Vaal, which receives the waters of the Harts, Riet, and Modder. The Olifants Vlei joins with the Zak to form the Hartbeest; and the Kuruman flows to the Molopo, both affluents of the Orange. The Orange system drains the great interior tableland, and the only streams outside it are the shorter ones that flow from the mountains direct to the sea. These include the Buffalo, Olifants, to be distinguished from the Olifants Vlei, Berg, Broede, Gouritz, Gamtoos, Sunday, and Great Fish.

There are forest regions in Pondoland and in the Knysna. The plateaux of the interior are covered with shrub, but in the coastal regions plant life is rich and varied. Sheep feed on the veld, where the great wild animals, elephant, rhinoceros, and others, have almost disappeared. The feature of the climate is its excessive dryness, which is specially beneficial to

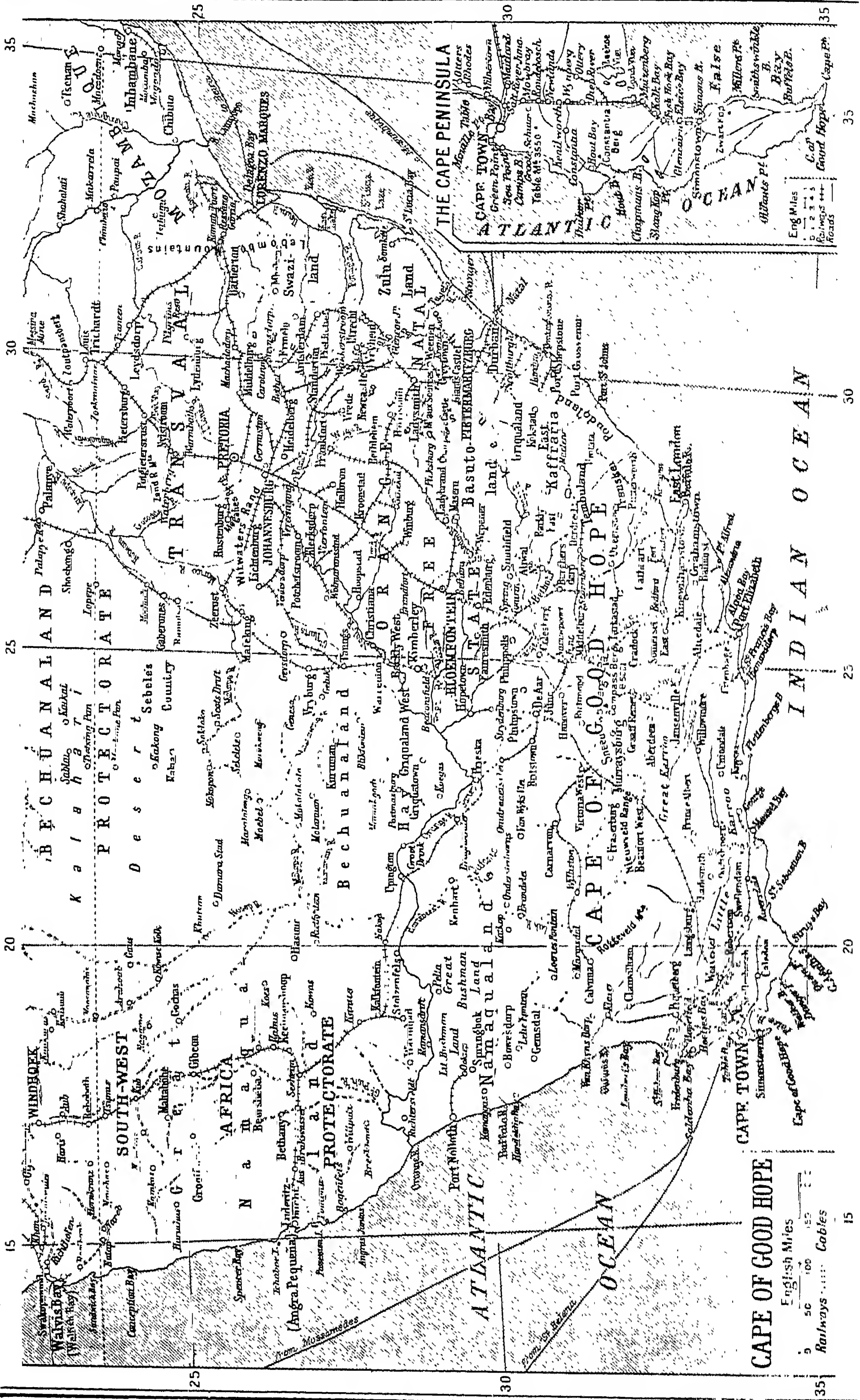
consumptives. The Wilderness and the Outeniqua Mts. are being developed as touring country.

Its 1951 pop. gave the prov. 54 members in the Union house of assembly; and it had four nominated and 22 elected senators under the 1955 reconstitution of the senate. Provincial affairs are managed by an elected council presided over by an administrator appointed by the Union.

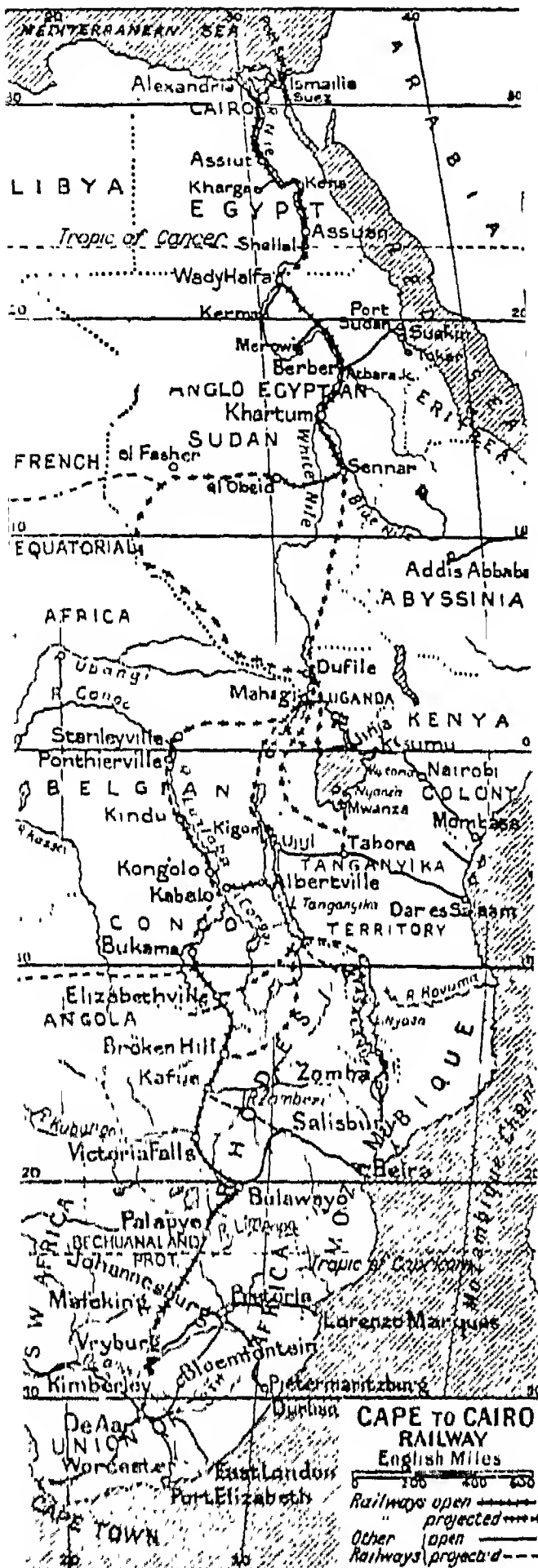
In 1956 the Cape prov. was divided into 133 magisterial districts, and the Cape prov. with Bechuanaland into 96 divisional council divisions. Each division has a civil commissioner and a resident magistrate; also an elected council which looks after the roads, etc., and has some financial power. There were 147 municipalities, each with a mayor or chairman and a council, and for smaller areas village management boards.

For the administration of justice there are the resident magistrates, while twice a year the judges go on circuit. The province has three superior courts, at Cape Town, Grahamstown, and Kimberley, from which there is the right of appeal to the Union supreme court.

Agriculture is the main industry. Sheep are reared, much wool



CAPE OF GOOD HOPE : PARENT PROVINCE OF THE UNION OF SOUTH AFRICA. INSET, THE PORTION CEDED TO BRITAIN IN 1814



Cape to Cairo Railway. See page 1740

is exported, while the vine is widely grown. Wheat is the chief cereal, others being oats, barley, rye, mealies or Indian corn, and Kaffir corn. Potatoes and other vegetables are grown, as are apricots, apples, peaches, and other fruits. Angora goats are reared for the mohair, much of which is exported, and ostrich farming is profitable when feathers are in fashion. There are good sea fishing and forestry. Minerals are found, the chief output being the diamonds from the Kimberley district. Manganese ores are mined at Postmasburg; copper ore is plentiful in Namaqualand. There is some gold, asbestos, silver, and tungsten. Education is free up to final school standard (X). There are 5,255 m. of rlys. under the control of the Union govt.

The history of the prov. begins with the discovery of the headland by the Portuguese in 1488. They named it the Cape of Good Hope, and the term "the Cape" has stuck to the district. In 1652 the Dutch made their first settlement here; this was a victualling station, which grew into Cape Town.

In 1795 Cape Town was taken by Great Britain, but in 1802 it was returned to the Dutch. In 1806 it was again seized, and in 1814 was ceded to the British for £6,000,000. The European pop., however, remained chiefly Dutch, though there were a few Huguenots. Its area was then about 120,000 sq. m.

Gradually the area was enlarged. In 1820 some settlers from England made their homes in the eastern district, forming what was known as the Albany Settlement, but before this the first war against the Kaffirs had taken place. They were pushed back, each war ending in an extension of the Cape boundary. Kaffraria was formed for them, but in 1865 this was added to Cape Colony, as was Transkei, the land across the river Kei, in 1877.

The Kaffirs were in a sense invaders, but the Boers had definitely made their home in the country, and with them, too, the British had trouble. In 1815 some of them rebelled, and abolition of the slave trade in the British Empire in 1834 (by an act of 1833) caused further unrest among them, and a number of Boers trekked away to the N.E. (See Voortrekker.)

Cape Colony itself grew larger and larger as the 20th century approached. In 1854 a legislative assembly of two houses was given, and in 1872 responsible government. In this way the colony was governed until 1910, the party system taking root, and the majority in the elected house providing the ministry. Among the prime ministers were Cecil J. Rhodes, J. G. Sprigg, and W. P. Schreiner. In 1910 it joined the Union, of which it is the largest constituent. See South Africa.

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Cape of Good Hope, UNIVERSITY OF. Educational institution dissolved in 1916 to make way for, in 1918, the three new universities of Cape Town, Stellenbosch, and S. Africa. It was incorporated in 1873 and existed only for examining and granting degrees. Its headquarters were at Cape Town.

Caper. Unopened flower-buds of the Caper-tree (*Capparis spinosa*). This is a shrub of the family Capparidaceae, native of S. Europe and the Mediterranean region. The flower-buds, and sometimes the unripe fruits, are pickled in vinegar. The flowers of *Zygophyllum fabago*, the bean-caper, are sometimes substituted for those of *Capparis*.

Capercaillie OR CAPERCAILLIE. (*Tetrao urogallus*). European game bird known as wood grouse or cock of the woods. It is about the size of a small turkey, and resembles the blackcock, being blackish grey in plumage, with a more or less green breast in the male. The hen has a reddish breast. It is found in the pine forests and is one of the game birds of Scotland, where it was introduced from Sweden.



Capercaillie, European game bird

Capern, EDWARD (1819-94). British poet, born Jan. 21, 1819, at Tiverton. He worked in a lace



Edward Capern, British poet

factory, and became rural postman of Bideford. In 1856 he brought out his first volume of Poems by the Bideford Rural Postman, followed by Ballads and Songs, 1858, and Wayside Warbles, 1865. He received a civil list pension of £40 in 1857, which was raised to £60 in 1865. Capern died at Braunton, Devon, June 4, 1894.

Capernaum. Village of Palestine, on the N.W. coast of the Sea of Galilee. It was intimately associated with Christ's ministry (Matt. 4, 8, and 17; Mark 1; Luke 4; John 2 and 6). It is identified by some critics with Tel Hum; by others with Khan Minyeh.

Capes, BERNARD EDWARD JOSEPH (d. 1918). British novelist. He made an early reputation with romantic stories of adventure. The Lake of Wine, 1898, may be said

to have made him a popular favourite, other works being *Our Lady of Darkness*, 1899; *From Door to Door*, 1900; *The Secret in the Hill*, 1903; *A Jay of Italy*, 1905; *A Rogue's Tragedy*, 1906; *Historical Vignettes*, 1910; *The House of Many Voices*, 1911; *The Story of Fifine*, 1914; *Moll Davis*, 1916. He died at Winchester, Nov. 2, 1918.

Capet. Name of the royal family of France, whose kings ruled from 987 to 1792 and from 1814 to 1848. A certain Frank, called Robert the Strong, was made count of Anjou and Blois in the 9th century, and the Franks chose one and then another of his descendants as their king. With the election in 987 of Hugh, a son of Hugh the Great, duke of France, began the kingdom of France.

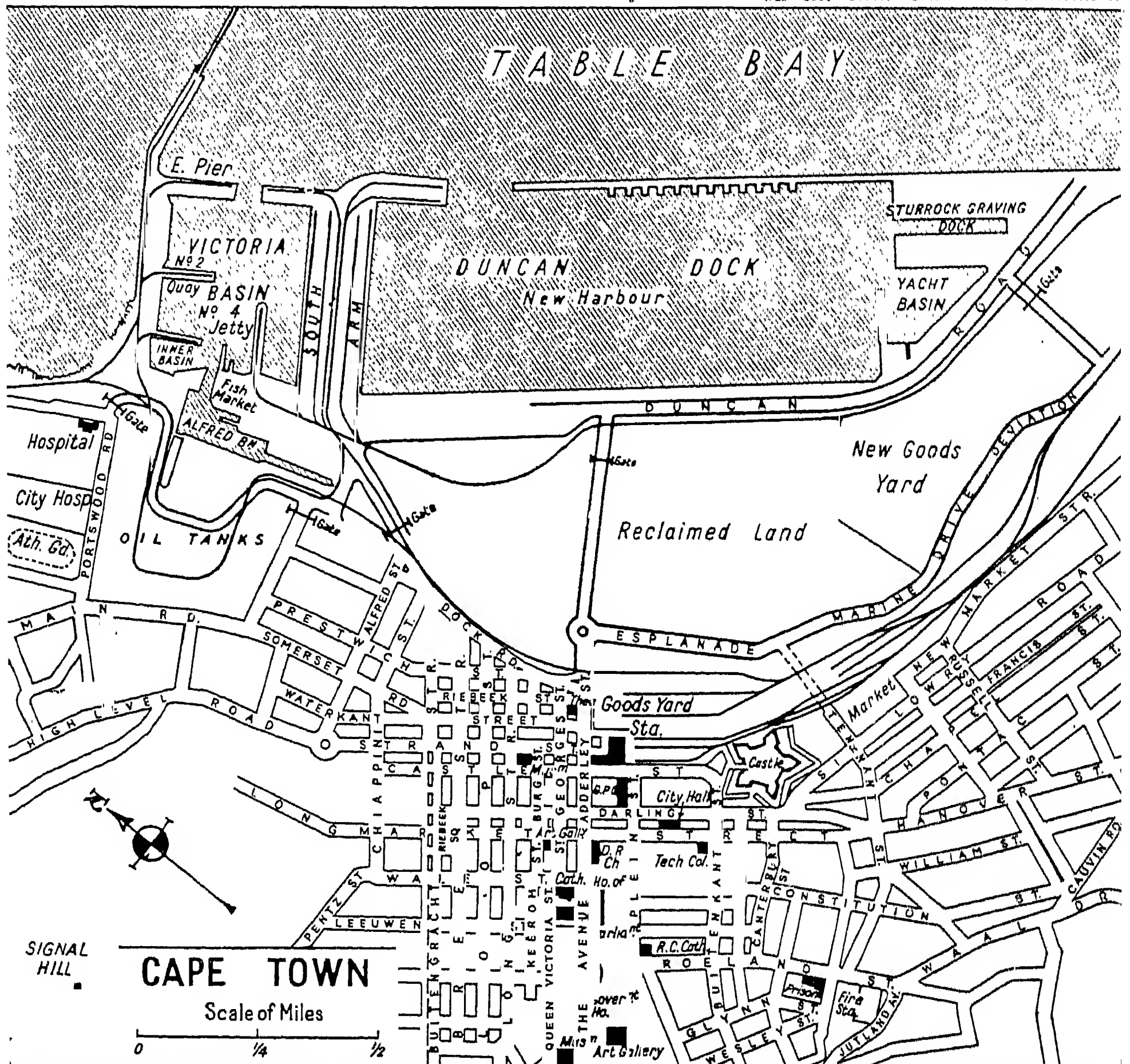
Hugh was the first of the house to be called Capet. The elder branch of the family died out with Charles IV in 1328, and the crown

then passed to the younger (Valois) branch. This ended with Charles VIII in 1498, and after the Valois Orléans branch had ruled for a short time, the throne passed to that of Valois Angoulême, of which Francis I was the first and Henry III the last king. The Bourbons who succeeded in 1589 were also a branch of the Capetian house, but are more generally known by the former name. Louis XVI, however, was tried by the Revolutionists as Louis Capet.

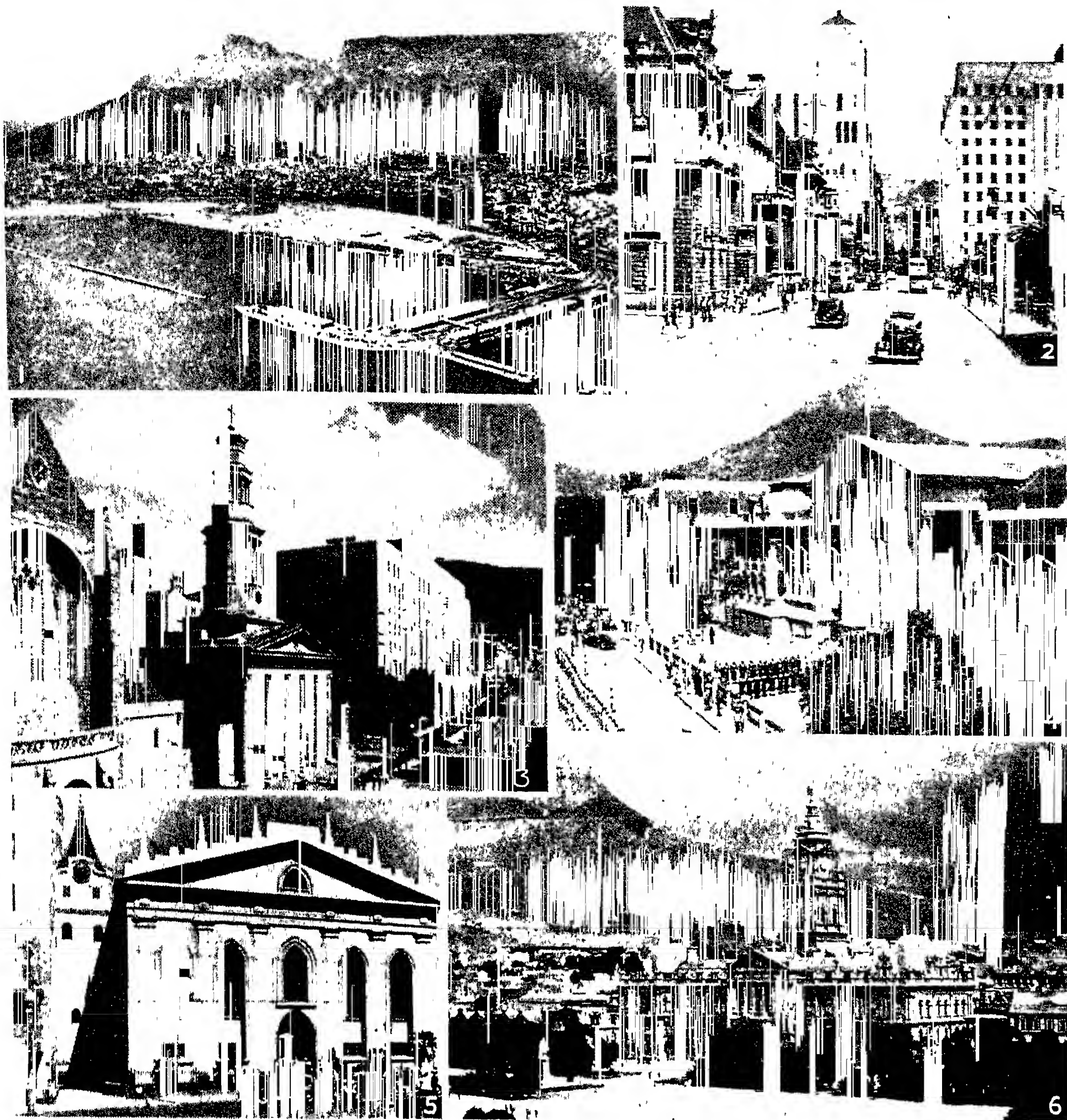
Younger branches of this family ruled from time to time over parts of France, and now and again over independent states. In 1032 Hugh Capet's grandson Robert became duke of Burgundy, and his successors were rulers of that land until 1361. Another and later line of the dukes of Burgundy, descended from Philip the Bold, sprang from the Capetian family, as also did the counts and dukes of Anjou.

Cape Times, THE. Daily newspaper, published in Cape Town. It was founded in 1876 by Frederick York St. Leger and R. W. Murray, and was edited 1895-1900 by Fydel Edmund Garrett, whose work greatly enhanced the paper's reputation and influence.

Cape to Cairo Railway. Line planned to connect Cape Town with Cairo, about 6,000 m. long. The conception formed part of the imperial dream of Cecil J. Rhodes. Lines were laid from Cape Town to Northern Rhodesia, from Cairo to Assuan in Egypt, and from Wadi Halfa to El Obeid in Sudan. The S. section was continued across Belgian territory to Bukama on the Congo, thus bringing Cape Town into connection by rail and navigable waterway with Stanleyville on the equator and Dar-es-Salaam on the coast. The N. section was continued S. to Sennar on the Blue Nile with a branch



Cape Town. Plan of the legislative capital and metropolis of the Union of South Africa, now also equipped as one of the world's great ports, as well as being one of the world's most beautiful cities



Cape Town. 1. General air view from above Table Bay, showing Duncan Dock and reclaimed land (centre). 2. Darling Street, in which stand the City Hall (left) and Post Office (right). 3. Cape Town Cathedral, and beyond it the building in which the government of Cape Province is carried on. 4. Parliament Buildings. 5. Die Groot Kerk, a Dutch Reformed church, founded in 1704. 6. City Hall, built in the style of the Italian Renaissance

almost due W. to El Obeid. The British acquisition of Tanganyika after the First Great War and the consequent more definite British control over traffic on the great equatorial lakes, led to the suggestion that the through route should make as much use as possible of train ferries on Lakes Tanganyika and Victoria. Such a development would require a new branch line from Broken Hill to the S. of Lake Tanganyika, a new line from Tabora to Mwanza, and one from the N. of Lake Victoria to Mahagi.

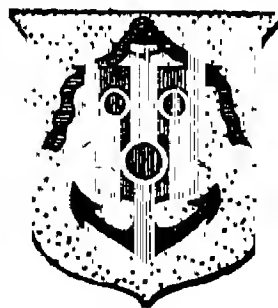
To complete the linking by rly. of all Africa branch lines to the coasts would be needed. A line

connects Elisabethville in the Belgian Congo with Benguela on the coast of Angola, and on the E. there exist connecting links to the chief ports S. of Beira. The coming of air transport, and the political changes of the mid-20th century, reduced interest in completion of the scheme.

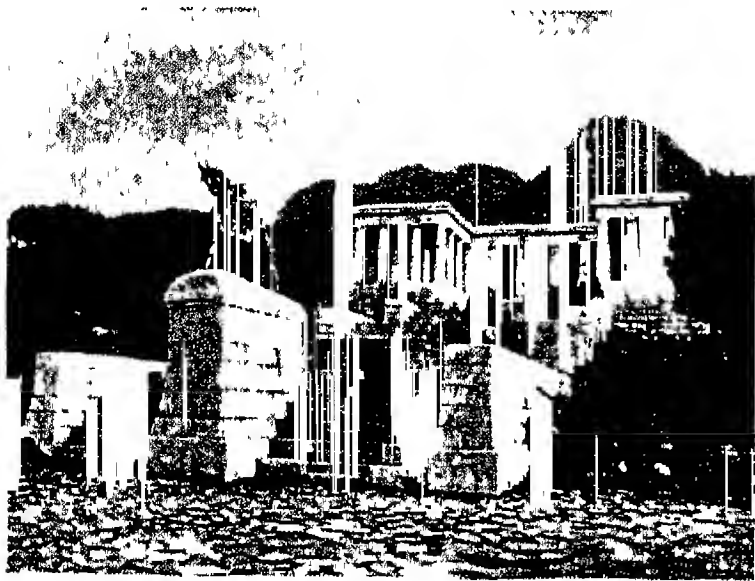
Cape Town. Legislative capital of the Union of South Africa, and capital of Cape Province. It is the oldest settlement in S. Africa. Situated between Table Mountain and Table Bay, it was laid out by the Dutch in 1652, and during the 17th, 18th, and early 19th centuries was the chief port of call on the sea route to the East,

being known as "the Tavern of the Indian Ocean." It was captured by the British on Sept. 16, 1795. Restored to the Netherlands by the treaty of Amiens, 1802, it was again taken on Jan. 10, 1806.

The city is beautifully situated, and presents a striking appearance from the sea. There are extensive commercial docks and a breakwater, 3,640 ft. long. Victoria Basin has been deepened, and the 200-acre Duncan Dock has been completed, giving a total enclosed water area



Cape Town arms



Cape Town. Rhodes Memorial at Rondebosch; the sculpture, Physical Energy, is by G. F. Watts

of 365 acres, with almost 25,000 ft. of quays. The Sturrock graving dock, opened in 1945, is the longest in the world (1,149½ ft.) except for that at Toulon. From Cape Town starts the rly. to the N. as well as several branch lines to the suburbs and outlying districts. Table Mountain may be ascended by aerial cableway.

The city and surroundings are well timbered, a fine avenue of oaks extending through the Municipal Gardens, in or near which are Government House, the Houses of Parliament (1886), the Public Library, the S. African Museum, and the Art Gallery in an annexe to the Museum. The Anglican Cathedral, dedicated to S. George, the first English church in S. Africa, was built in 1830. A new cathedral has been erected at a cost of £200,000. The old university buildings overlook the Botanical Gardens, and the castle, begun by the Dutch in 1666, is across the Parade Ground and overlooks Table Bay. Cape Town is laid out regularly in blocks, and many old Dutch houses still stand. A wide stretch of reclaimed land along the central waterfront promises attractive development. The mountain slopes are increasingly developed as residential areas.

The suburbs, of which the principal are Mowbray, Rondebosch, Kenilworth, and Wynberg, are delightfully situated, and watering-places are within easy reach at Muizenberg, Kalk Bay, and Simonstown, all on False Bay. At Rondebosch is Groote Schuur, once the residence of Cecil Rhodes, near which are zoological gardens, the Rhodes memorial, and the university. Pop. (1951) 577,648; of whom 247,442 were white.

Cape Town, UNIVERSITY OF. Educational centre, established in 1916 as one of the three universities of South Africa. Its new buildings are magnificently sited near Groote Schuur. Its endowment

includes £500,000, provided by Sir Julius Wernher and Alfred Beit.

Cape Verde (Port. *Cabo Verde*, green cape). Most westerly promontory of Africa. It is between the Gambia and Senegal rivers, in lat. 14° 48' N., long. 17° 34' W., and was discovered and named by the Portuguese in 1443.

Cape Verde Islands (Port. *Ilhas do Cabo Verde*). Fifteen mountainous and volcanic islands in the Atlantic. Situated 350 m. W.

of Cape Verde on the W. coast of Africa, they were discovered in 1441-56 by the Portuguese, and belong to Portugal. The chief islands are Santiago (São Thiago), containing the capital, Praia; São Antão; São Vicente, with the coaling station of Porto Grande (Mindello); São Nicolão, Boa Vista, Sal, Fogo, Brava, and Maio.

The highest peak, in the island of Fogo, is 9,745 ft. high, and was an active volcano as late as 1847. Vessels anchor in the bay at Porto Grande, and discharge cargo by means of lighters, as at Praia, on a smaller scale. The chief products are coffee, castor oil, brandy, oranges, hides, maize, millet, beans, tobacco, manioc, cane sugar, sweet potatoes. Turtles and amber are found in the surrounding seas. The inhabitants are of a mixed Negro and Portuguese origin and speak a dialect of Portuguese. Area, 1,557 sq. m., of which 425 sq. m. are in Santiago. Pop. (1950) 147,331 (2,913 Europeans).

Capias (Lat., that you take). In English law, a virtually obsolete writ ordering a sheriff to arrest a person. There were formerly several writs of this kind. The *capias ad respondendum* could be used, until abolished by the Crown Proceedings Act, 1947, to begin crown proceedings for the recovery of customs penalties. The *capias ad satisfaciendum* (ca. sa.) was the basis of imprisonment for debt; after the abolition, subject to a few exceptions, of imprisonment for debt by the Debtors Act, 1869, this writ was little used, but it was revived in 1944 at the instance of the crown to whom the Debtors Act did not then apply. The Crown Proceedings Act, 1947, applied the Debtors Act to most crown debts; but there are certain debts to which it does not apply and in these it is still possible in theory for the ca. sa. to be used.

Capillarity (Lat. *capillus*, hair). Phenomenon of the ascent

or descent of liquids in tubes of hair-like calibre. The absorbent action of lamp wicks, sponges, and blotting-paper is caused by capillarity; the interstices between the solid parts of these substances are of diameters comparable with hairs. Capillarity is a manifestation of surface tension due to the attraction of the molecules of a liquid for each other or for the solid surface with which the liquid is in contact. There is in every liquid substance an attraction between the molecules of which it consists. Some liquids, e.g. water, are attracted by glass; others, e.g. mercury, are repelled by glass. The former liquids creep up the sides of a glass tube partly immersed in the liquid. The surface tension depends on the nature of the liquid; that of water is greater than that of oil. Water has a greater tendency than oil to collect in drops; on the other hand, if a small quantity of oil is poured on to the surface of a pond it will spread out until it is a film of almost negligible thickness. Capillarity plays an important part in the life of animals and plants, assisting the various juices to reach remote parts of the organisms. But for capillarity a tree 50 ft. high, would seem to be impossible, for the substances from which the leaves are made are drawn partly from the soil in which the roots live.

Capillary. A fine tube with a hair-like bore. The term is applied in anatomy to the smallest branches of the blood-vessels.

Capistrano, GIOVANNI DA (1386-1456). Italian theologian. Born at Capistrano, in the Abruzzi, June 24, 1386, he became a Franciscan friar when 31 years old, and was twice vicar-general of his order. Acting with S. Bernardine of Siena he reformed the Order, and was sent as papal legate to Moravia in 1451, when his eloquence won many adherents. He died Oct. 23, 1456, and was canonised in 1690 by Pope Alexander VIII (the bull of canonisation was not published until 1724).

Capital. In finance, the money lent; as distinct from the interest charged (Lat. *interesse*, to be between, i.e., that which came between the amount lent and the total received back). Its earliest associations were with the practice of moneylending, and the "exaction" of usury, a usage that was for centuries opposed by church authorities and the great theologians and ecclesiastical writers of the early and middle

ages, when what is now known as economics was regarded as a branch of theology.

Money, unlike land, was to them "unfertile," and "to recompense the use of capital belonging to another was sinful" (Neumann). The Church, however, found it increasingly difficult to denounce the payment of interest, and at the same time to maintain its justification of the then widespread practice of securing an income by the purchase of "rent charges," even on the ground that they were attached to "fertile" land, since the absentee landlord, like the lender of money, did nothing himself to increase that fertility. He regarded land as a security for the return of his money. Tenants of church lands even pointed out the close resemblance between "rent" and "interest." In each case, it was the labour of the borrower that created new wealth out of which alone could payments of rent and interest be made—the lenders were passive recipients of part of the income of the borrower.

Economists' Conception of Capital

Until the eighteenth century, dictionaries continued to define capital as a "sum of money lent," and capitalist as the "person who lent it." Then, under the pressure of the teachings of a new science—economics—came a change. This new movement attempted a scientific, rather than an ethical, study of the make-up of society, and the respective parts played by individuals and institutions, and how they were respectively remunerated by society. The aim was to discover some unifying plan into which these parts naturally fitted. Economists quickly pointed out that undue importance had been given to money, and that this had hidden from view the real factors that created the amenities of life. Money, itself, was not wealth, but merely the nominal expression of it. Thus a new conception of capital arose—an economist's conception.

"Capital," said the economist Ricardo, "is that part of the wealth of a country which is employed in production, and consists of food, clothing, tools, raw material, and machinery necessary to give effect to labour." This definition implied that all incomes arose, ultimately, as a result of the impact of human labour on the natural resources of the earth. Money could only therefore beget money by first

being changed into either labour or material things.

Capital in the economist's sense is essential to any form of productive organization, though capitalists are not. They exist only in that form of society which allows them to exist. Economic capital, by the scientific harnessing of the forces of nature, enables man to do tasks demanding millions of times the strength of the human arm. It thus reduces the amount of necessary toil, and makes possible greater time for leisure. It enables goods to be produced ahead of the time they are actually needed and thus forms a reservoir out of which a steady stream can flow. It enables specialisation of human skill, and a unified direction of human effort.

Definition of Karl Marx

Marx was the first economist to include labour itself in the concept of capital. He called material equipment "constant capital," because of itself it could not add to value. Labour he called "variable capital," because it alone could add to value. "Profit" was made because labour created more value than its own value. Thus "profit" was "surplus value" earned by the workers but appropriated by the owners.

The modern economist regards capital as "a stock of goods of all kinds including land, existing at a given time" (Benham). For clearness of reasoning, he keeps labour in a separate category.

Bowley, Stamp, Campion, and others have prepared careful estimates of national capital (*i.e.* the gross value of the stock of assets possessed by the inhabitants of a nation at a given time), and of national income. Lord Keynes introduced a new set of relationships between saving (not spending) and investment (creating capital goods), and the part they play in influencing "price" and "unemployment" levels in a capitalistic society.

In the earliest commercial ventures each partner was liable for the entire debts of the whole, no matter how small a stake he had in it. The device of limited liability legalised in joint stock companies enabled any member of the public to invest in a company with a clearly stated amount of capital and with liability limited to this amount. Capital is now subscribed by members of the general public, who buy shares with or without priority rights to a share in the profits. The "legal" capital of such a company is the "total share"

capital. The actual capital used is usually more than its "legal" capital. The company may borrow on debentures, or from a bank, or keep back past profits, or it may buy goods on credit. Legal capital and payments on it are inadequate to give a picture of the company's real position. The word "capitalisation" is sometimes used to denote the legal capital plus those other funds with which the company really works.

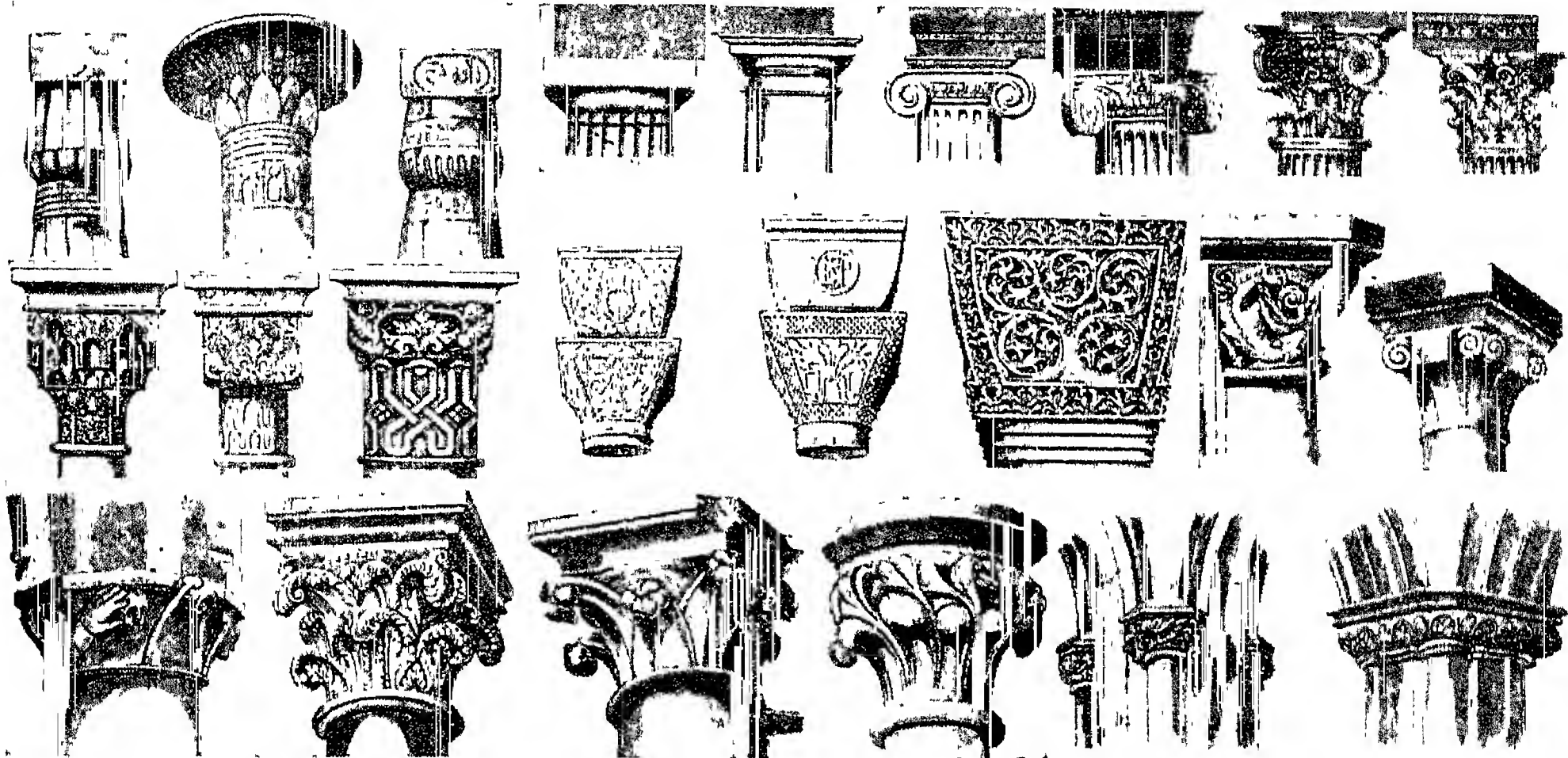
Business capital in modern communities is bought and sold on what may be called the money and capital market, the features of which are similar in all countries. A central bank for the creation of currency and credit; short term and long term loan markets; a market for the creation of stocks and shares, a market for the transfer of stocks and shares; a foreign currency market; a house-mortgage market; and an insurance market. These fit together in an ever-changing design of debits and credits.

A planned economy sets itself to control the financial "middlemen" between labour and "real" capital. The three outstanding control points, so far as the U.K. is concerned, are the Treasury, the Bank of England, and the Stock Exchange; and any system for the control of capitalism, therefore, first seeks to control these. See Capitalism.

J. E. Bruton, B.Sc. (Econ.)

Capital (Lat. *caput*, head). In architecture, the topmost member of a column or pilaster. When the column supported an entablature, the capital was the connecting link between the two. The three "orders" of Greek architecture are mainly distinguishable by the capitals to columns, and when the Tuscan and Composite orders were added by the Romans, corresponding varieties of capital accompanied their introduction.

The earliest columnar architecture known, that of Egypt, had capitals no larger in circumference than the top of the column. Early Persian architecture reveals columns with heads or capitals sculptured in the form of animals. Neither of these, however, served more than a decorative purpose. The Ionic capital, with volutes extended right and left, was supposed at one time to have been a legacy of early wood construction when the short longitudinal piece or corbel was attached to the tips of two or more upright posts in order to shorten the reach of the beam traversing them; but the



Capital: in architecture. Top row, from left to right: three capitals from Ancient Egypt; six classical examples: Greek Doric, Roman Doric, Greek Ionic, Roman Ionic, Composite, Corinthian. Centre row: three Moorish capitals in the Alhambra; three Byzantine cushion capitals; two Norman examples. Bottom row, Gothic capitals: two of the Transitional period, late 12th century; two Early English examples, 13th century; two Perpendicular, late 15th century

discovery of early wooden capitals with obviously decorative volutes exploded this theory.

The cushion capital of Byzantine architecture, which resembles a shallow bowl, with sides so truncated as to make its upper part a square, served a useful constructional purpose in the development of the arch, and was widely adopted in Romanesque architecture.

Renaissance builders used all types of classical capital, with a preference for the foliated Corinthian model, and the preceding Gothic styles adhered to the latter in greater or less degree. The moulded capitals of the Early English style are an exception, showing originality of design.

Capital. English form of the title of the classic work on Socialist economics by Karl Marx, noted under Kapital, Das.

Capital Duty. In the United Kingdom, a stamp duty of 10s. per £100 payable on the nominal share capital of a limited liability company when the company is formed or the nominal share capital increased. A stamp duty of 5s. per £100 is payable on loan capital—for example, debentures—of companies or of local authorities, corporations, and other similar bodies.

Capitalism. Term used for an economy or method of determining economic activity that is the antithesis of an economic dictatorship. Its essential conditions or characteristics are: (1) *private ownership* of at least some of the agents of production, e.g. land, buildings,

machinery, materials, and money exchangeable for goods or the services of employees; (2) *freedom of enterprise*, i.e. the liberty to begin or to stop a particular form of economic activity; (3) *freedom of choice* of the individual to buy and sell goods produced or personal skill or other forms of private property; (4) *pursuit of private profit* as the motive of economic activity; (5) *acceptance of private profit as a criterion* and measure of the desirableness and efficiency of particular economic activity.

The term capitalism is used in contrast with socialism, communism, feudalism, etc. Socialism and communism exclude or limit the operation of the five conditions mentioned; feudalism excludes them and enforces traditional economic activities and relationships. But all economies other than the most primitive involve the use of capital (*q.v.*); they are not for that reason capitalistic. Economic activity is capitalistic only when it is carried on under the essential conditions of capitalism.

Of these conditions the most distinctive are (4) and (5). Private profit can arise only if the price realized for a commodity is greater than the money cost of producing it; accordingly, under capitalism the activity of organizers is stimulated and directed by the prices that they think will be eventually obtainable for the commodities if they produce them. Those prices are the indicators they follow when deciding what to produce and when and where to make goods available. Hence the

anticipated prices are the only effective indicators of social need. If it is believed that the price in one case will yield a bigger surplus than in another, production will tend to be diverted to the one and from the other in the pursuit of the maximum profit. In this way, the advocates of capitalism argue, the most efficient use of economic resources is secured, and the maximum social satisfaction is obtained as a by-product of the profit-making. For prices reflect both the demand and the supply; the demand is considered to express social need; and increased demand will support a higher price; this will encourage a bigger supply to satisfy it; thus is secured the co-ordination of economic activity with social need. Opponents of capitalism deny that social need can be expressed by the demand for commodities or by the profit potentialities of prices.

Freedom of enterprise and freedom of choice depend for their social value largely on the ability of individuals in their economic relations to pursue their own interest. This assumes informed, rational self-interest, a condition that seldom exists. But the freedom necessarily results in competition, both to supply commodities and to buy them. Competition of suppliers tends to diminish their profits. There is therefore a natural temptation for suppliers to try to restrict their competition with one another—by cartels and other selling arrangements, by combination of firms and other approaches to monopoly, and by attempts to

restrict freedom of enterprise of those who may want to enter the market as suppliers. Such restrictions have become most marked during the 20th century. Competition of buyers tends to raise prices and to diminish the buyers' profits; buyers similarly are tempted to restrict their competition, often by producing the commodities they have hitherto bought. Hence the tendency to what is often called "vertical combination." Capitalism has, therefore, strong inherent pressure towards the restriction of competition.

The same pressure has encouraged large-scale organization of business and the unification under one control of all the processes incidental to the manufacture and sale of a commodity. This tendency towards combination may have technical advantages where it facilitates the use of large-scale methods of production; but at the same time it reduces the pressure of competition to lower prices to the consumer. It has the effect of concentrating great power in the hands of a relatively small number of people. For these reasons, both the U.S.A. and the U.K. have passed legislation against such practices. Consult *The General Theory of Employment, Interest, and Money*, J. M. Keynes, 1936.

Capital Levy. Tax on the capital of living persons, as distinct from death duties. Such a tax was advocated by Ricardo in 1819, to pay off the national debt. In Germany a tax on capital, payable in two contributions, was levied in 1913 to pay for armaments. A form of capital levy, spread over many years, was also introduced in Italy and Czechoslovakia in 1920. In the U.K. a capital levy was again suggested by a Conservative M.P. in Nov., 1914, as an alternative to high income tax. For some years the question was discussed by economists, arousing sympathetic interest among members of all political parties. In 1920 a select committee of the house of commons examined the possibility of a tax on capital accumulated as a result of the First Great War, but in face of an improving financial situation no action was taken. In the general elections of 1922, 1923, and 1924 the Labour party supported the idea of a capital levy to provide the means for their schemes of social reform, but dropped it in 1927. The Labour govt.'s budget of 1948 included a special levy of from 2s. to 10s. in

the £ on all income-producing capital of persons having a total income exceeding £2,000 of which investment income exceeded £250.

Capital Punishment. The penalty of death, as inflicted on offenders against the laws from the earliest times. The tendency since the middle of the 19th century in every country has been to reduce the list of capital offences. In England more than 200 capital felonies were created by the statutes of the 18th century, and included not only forgery, but even petty thefts. Parliamentary Acts in 1823, 1826, and 1837 abolished the death penalty for most of these offences, and by the law of 1861, only for treason, murder, piracy with violence, and the firing of government arsenals and dockyards can the death penalty be inflicted. It cannot be imposed on any person under 18 or on a pregnant woman.

During the Second Great War, treachery, breaking through a sentry guard, and looting were temporarily made capital offences. In the armed forces mutiny with violence and in certain circumstances is a capital offence, as is also in the navy cowardly failure in duty in action.

A select committee appointed in the U.K. in 1930 to consider capital punishment recommended suspension of the death penalty for an experimental period of five years, with substitution of life imprisonment (in practice, 20 years). An amendment to the Criminal Justice bill of 1948 to this effect, passed by the commons, was rejected by the lords.

Capital punishment, abolished in e.g. Brazil, the Netherlands, Norway, and abandoned in practice in e.g. Belgium, Denmark, was reintroduced in 1945 in several of the countries occupied by the Germans during the Second Great War, as a punishment for some forms of collaboration with the enemy. There is no death penalty in several states of the U.S.A.

Capitals. Large letters used at the beginning of words in writing or printing. The earlier alphabets do not appear to have had more than one series of letters. The Hebrew alphabet has only one. Greeks and Romans capitalised important words. Early printers on occasion used capital and small letters indiscriminately, as one or the other may have fallen short. The irregular use of capitals in the First Folio of Shakespeare's works led Ignatius Donnelly (q.v.) to his idea of the cryptogram.

Since the 18th century the tendency has been to reduce the use of capital letters, but much confusion has arisen from the different systems adopted by different printers, as in the use of "The" or "the" in titles of books, etc. In English-speaking countries Latin is printed in accordance with the printing of English, but generally speaking, each country has its own way of capitalising. Where in English we find "the Arabic language," the German would write or print "die arabische Sprache." Whereas in English we write "the German language," the French style is "la langue allemande." English printers now usually confine capitals to proper nouns, personifications, words in apposition (Alexander the Great), name and synonyms of the Deity, the first word in every line of poetry and of each sentence, principal words in book titles (New Universal Encyclopedia), the personal pronoun I, exclamations (O! or Ah!), certain adjectives derived from proper nouns (Baconian), and titles of high officers (President Truman).

Capitation (Latin *per capita*, by the head). A capitation fee is a levy or fee payable per member by a branch to the headquarters of an organization. A capitation grant is a grant based on membership numbers, e.g. that made by the state to certain youth organizations. A capitation tax is a tax per head, e.g. the poll tax applied in England on various occasions between 1377 and 1698.

Capito, GAIUS ATEIUS (c. 40 B.C.-A.D. 22). A Roman jurist. The founder of a conservative legal school at Rome in opposition to the innovation of Antistius Labeo. A supporter of Augustus, he is accused of being a time-server and a servile flatterer of Tiberius. He was the author of voluminous legal commentaries.

Capito OR KOEPFEL, WOLFGANG FABRICIUS (1478-1541). German Protestant reformer. Born in Alsace, he entered the Benedictine order, and in 1515 was appointed to the chair of theology at Basel. In 1519 he was made chancellor to the elector of Mainz, and in 1523 provost at Strasbourg. Becoming a Protestant at this time, he took part in the conferences at Zürich and Marburg, was concerned in drawing up the Confession of Augsburg, and at the Council of Basel vainly endeavoured to reconcile the opposing parties among the Protestants.

Capitol. General name for the Capitoline Hill (Mons Capitolinus), one of the seven hills of Rome, on which were the *arx* or citadel and the most famous of all Roman temples, the temple of Jupiter Optimus Maximus, Juno, and Minerva. On the south-west was the Tarpeian Rock, the cliff from which criminals were hurled. The name Capitol was also used for the temple itself, which was said to have been begun by Tarquinius Priscus and completed by Tarquinius Superbus. There the Sibylline Books were kept and victorious generals offered sacrifices to Jupiter. The temple was burned down three times, in 83 B.C., A.D. 61, and A.D. 80, being rebuilt for the last time by Domitian. The present Campidoglio was designed by Michelangelo at the suggestion of Pope Paul III, and comprise a palace, museum, etc.

It became customary to build a *capitolium*, or temple to Jupiter, in Roman colonies, and in time most provincial towns of any importance had a capitol.

Capitol. Name given to the seat of the congress of the U.S.A. at Washington, D.C. It is also used for the buildings of the various state legislatures at Albany (*q.v.*), Austin, and other state capitals.



Capitol. The buildings, designed by Michelangelo, which stand on the Capitoline Hill of ancient Rome

The first capitol at Washington was begun in 1793, first used in 1800, and finished in 1811. The interiors of this building were burned by the British in 1814. Reconstructed 1815-18, and re-occupied 1819, it has been subsequently added to. It occupies $3\frac{1}{2}$ acres at the E. end of Pennsylvania Avenue, and is remarkable for its large and lofty dome (external diam. 135 ft. 5 ins.) and its many Corinthian columns. The chief apartments are the rotunda, the statuary hall (formerly the meeting-place of the house of representatives), and the supreme court (which was formerly the meeting place of the senate). Near it is the library of congress, and various marble buildings which house staffs carrying on the work of government.

Capitulary (Lat. *capitulum*, little head or chapter). Name given in the Frankish empire to a law or order issued by the king. The capitularies, so called because they were divided into chapters, were issued from the 7th century, possibly earlier, and dealt with all state activities. Some were collected in 827.

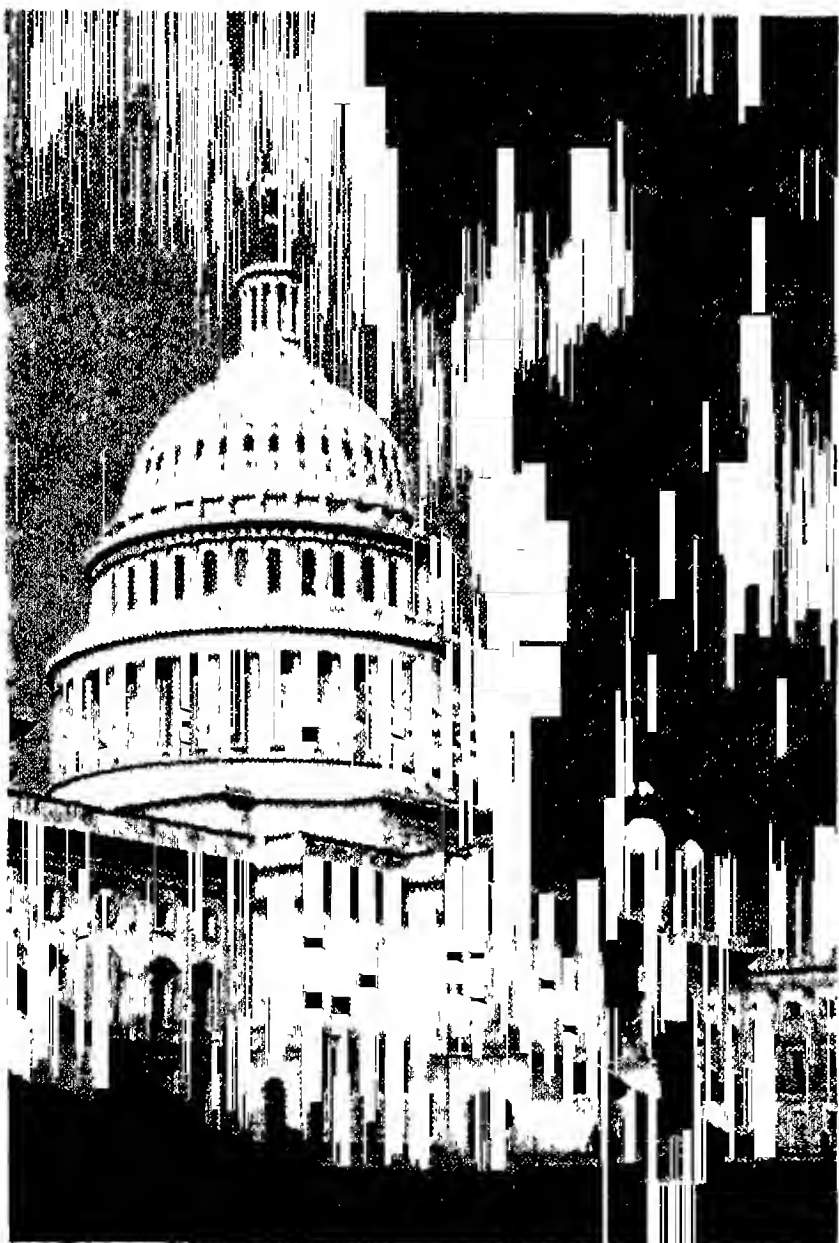
Capitulation. In international law, the surrender of a fortress, an army, or a warship on agreed terms. It differs from a simple surrender in that it is unconditional.

The word capitulation is also applied to a treaty under which a state agreed that nationals of another state in its territories should not be subject to its courts or laws, but should be tried either before a consul of their own state or a mixed tribunal; their state was then said to have extra-territorial jurisdiction. Formerly many such treaties existed between western European powers and the United States on the one hand and states such as China, Turkey, and Egypt on the other. Capitulations in this sense were almost entirely abolished after the Second Great War.

Capitulum. Botanical term for a very short inflorescence in which the axis is flattened and laterally expanded. It bears numerous, closely packed, stalkless flowers, with the oldest at the margin and the youngest in the centre. The massed flowers of a capitulum simulate a single flower. Common examples are the daisy and the dandelion and other members of the Compositae family. See also Inflorescence.

Capiz. Town of Panay, Philippine Republic. The capital and chief harbour of the prov. of Capiz, it lies near the mouth of the Panay river, 200 m. S.S.E. of Manila. It exports fibre, copra, and alcohol. Much of the province is mountainous and thickly wooded. Its valleys are well watered and fertile, producing rice, sugar, tobacco, cotton, and minerals. Area prov., 1,661 sq. m., pop. (est.) 230,000; town, pop. 20,000.

Cap Martin. Promontory and winter resort of France in the department of Alpes-Maritimes. The promontory is 235 ft. high, and on its summit are traces of an 11th-century convent. Near by



Capitol. The great dome of the Capitol at Washington, D.C.

are the Villa Cynos, a residence of the ex-empress Eugénie, and a monument, the one remnant of Lumone, a Roman military station.

Capnomancy (Gr. *kapnos*, smoke; *manteia*, divination). Divination by the movements of smoke, usually that of a sacrifice, to which the ancients attached great importance. If the smoke was thin and light and ascended in a straight column, the omen was favourable; if, on the other hand, it hung heavily about the altar, or was blown about by wind, the gods were supposed to be unpropitious. See Divination.

Capodistria. Italian and historic name of Koper, a town of Yugoslavia, Austrian until 1919, Italian 1919-47, then in the free territory of Trieste (*q.v.*). It is built on a rock in the Gulf of Trieste, 9 m. S. by W. of the city of that name, and is connected with the mainland by a causeway. An old town, it bears a great resemblance to Venice. Capodistria has large works for obtaining salt from sea water, and carries on fishing and the cultivation of vegetables and fruit. The ancient Aegida, later called Justinopolis, it was an important town in the Middle Ages, being, as its name implies, the capital of Istria. Pop. 11,700.

Capo d'Istria, JOHN ANTONY, COUNT (1776-1831). Greek politician. Born at Corfu, Feb. 11, 1776, he held important government appointments in the Corfu Islands from 1802 to 1807. When the French occupied the islands he entered the diplomatic service of Russia, was Russian minister to Switzerland, 1813, and took part in the congress of Vienna in 1815. His consistent policy was to establish Russian influence in Greece. His increasing unpopularity as president of the Greek republic in 1827 culminated in his assassination at Nauplia, Oct. 9, 1831.

Cap of Maintenance OR CAP OF STATE. Low cap of crimson velvet, turned up with a broad border of ermine, the border having two short pointed tails. It is borne before a British sovereign at the coronation, and worn by him (her) during part of the ceremony. It seems to have been a symbol of honour for the sovereign's lieutenants and palatine nobles. It occurs in heraldry as a charge.

Capone, OR CAPONI, ALPHONSO (1895-1947). An Italian-born U.S. criminal "gangster." He was born near Rome, Jan. 6, 1895, the second son of a shopkeeper, who later settled in Brooklyn,

N.Y. Alphonso, better known as Al, received the nickname of Scarface because of injuries received as a member of a New York criminal gang soon after the First Great War. Moving to Chicago, he organized a ten-year reign of intimidation during the era of prohibition. The illicit liquor trade of Chicago fell into his hands, and from the sale of liquor alone he was very soon credited with a fortune equivalent to £25,000,000. He also controlled many gambling saloons and brothels. His success was achieved by the organization of gangsterism on an unprecedented scale, maintained by force and the ruthless elimination of all rivals. The gang led by Capone was said to have been responsible for 500 murders, while Capone and three of his brothers, Ralph, Frank, and John, lived a life of extravagant luxury, and showed great cunning in evading the law. In 1930 the U.S. Federal Bureau of Investigation declared Capone to be public enemy No. 1, and in 1931 was able to charge him with defalcation in payment of income tax, for which he was sentenced to ten years' imprisonment. Released in 1939, suffering from a disease of the brain, he retired to Miami, where he died Jan. 25, 1947.

Caporetto, BATTLE OF. Action of the First Great War. The battle was fought in Oct., 1917, between Italian and Austro-German forces, and resulted in the disastrous but not irretrievable defeat of the former. It takes its name from the small town of Caporetto on the R. Isonzo, later in Italy, then, from 1947, in Yugoslavia, but at that time some 5 m. within Austrian territory.

An Italian summer offensive under Cadorna, against Austria, had come to an end in Sept., 1917, with a front held by the Italian 2nd army under Capello, extend-

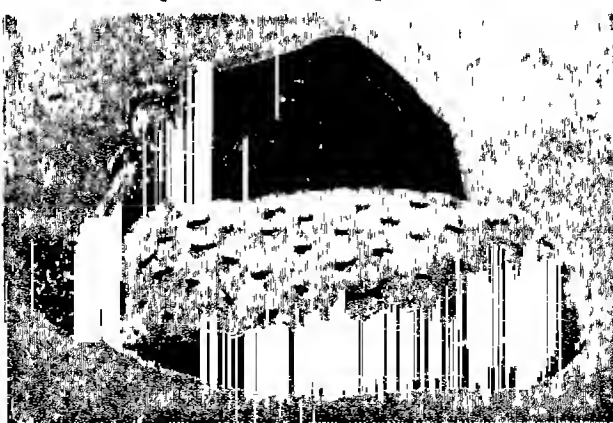


Al Capone, Italo-U.S. gangster

ing through the Isonzo area from Monte Rombon, N. of Plezzo, to the Adriatic. The Austrian armies had suffered severely, but were strongly reinforced by German troops. Although this latter fact was known to the Italians, they were expecting the main weight of any Austro-German attack to come from the N., i.e. from Trentino, Cadore, and Carnia. But von Below, transferred from the French front, had arrayed a new army consisting of seven German and nine Austrian divisions against the Italian 2nd army between Mt. Rombon and Auzza, S. of Tolmino.

After an intense bombardment of the whole 2nd army front, the attack opened on Oct. 24, under cover of a thick mist. The Italian centre broke, the front being pierced N. and S. of Tolmino, weakest point in the line. The Isonzo was crossed at Tolmino and the attacking forces converged on Caporetto from N.E. and S.E. Throughout Oct. 25 the gap was enlarged. On most of the front the struggle was bitter, but at many points Italians whose reserves did not appear in time offered little or no resistance. The flanks were compelled to withdraw, Caporetto was lost, and masses of Italians were in headlong retreat under the shock of disaster. To bring up reserves through the midst of fugitives was almost impossible.

By the afternoon of Oct. 26 Below was pressing down the valleys of the Indrio and Natisone and sending a considerable force into Carnia. Italians there maintained their ground and the duke of Aosta's 3rd army had held all attacks in the Carso, but the communications of the whole Isonzo and Carnia lines were so threatened that Cadorna ordered a general retreat to the W. of the Tagliamento. This began on Oct. 27. It was conducted under great difficulties, of which the fact that the Tagliamento was in heavy flood was not the least. By Nov. 1 the Germans had broken into the Friulian plain; Gorizia was again Austrian; Cividale, formerly Capello's headquarters, and Udine, Cadorna's headquarters, were in Below's hands, the former a burning ruin. The Germans claimed the capture of 200,000 prisoners and 2,000 guns. Two days later, Below forced the Tagliamento, and on Nov. 4 Cadorna ordered a further retreat to the Piave. By Nov. 16 the Italians were standing there, the Germans had outpaced their supplies, and the retreat was at an end. See Piave, Battles of the.



Cap of Maintenance. Cap used in the coronation of British sovereigns

Cappadocia. District of Asiatic Turkey. This rough hilly country was in Roman times bounded on the N. by Pontus, on the E. by Armenia, on the S. by the Taurus Mts., and on the W. by Lycaonia and Galatia. After forming part of the Persian and Greek Empires, it was for a time independent under kings of its own, but became a Roman province A.D. 17. In one period it included Pontus. Its capital was Mazaca, afterwards Caesarea, the modern Kaisari.

Capparidaceae. Family of herbs, shrubs, and trees. Natives of the tropical and sub-tropical regions, they include 40 genera and about 450 species. They have usually alternate leaves, and the flower-parts in fours or multiples thereof. The fruit is pungent and stimulating. See Caper.

Cappel OR KAPPEL. Village of Switzerland, in the canton of Zurich, 4 m. N. of Zug. It is noted as the scene of Zwingli's defeat and death, Oct. 11, 1531, when fighting against the cantons.

Capponi, GINO, MARQUIS (1792-1876). Italian statesman and man of letters. Born at Florence, Sept. 14, 1792, he became, in 1848, head of its grand-ducal government, and in 1860, after the unification of Italy, was made a senator. His chief literary work is the *Storia della Repubblica di Firenze*, 1875. He died at Florence, Feb. 3, 1876.

Capponi, PIERO (1447-96). A Florentine statesman. He was employed by Lorenzo de' Medici on various foreign missions, but after his patron's death, 1492, took a leading part in expelling his successor, Piero, from Florence. Capponi became head of the Florentine republic, successfully withstanding the exorbitant demands of Charles VIII of France, with whom he negotiated an agreed peace in 1494. He was killed while fighting against the Pisan rebels, Sept. 25, 1496.

Capra, FRANK (b. 1897). Italian-born U.S. film director. Born at Palermo, Sicily, he began to direct short comedies in Hollywood in 1921, but embarked on more ambitious productions, such as *Lady for a Day*, 1934, *Mr. Deeds Goes to Town*, 1936, the fantasy *Lost Horizon*, 1937, and the comic-macabre *Arsenic and Old Lace*, 1945. He became president of the Academy of Motion Pictures, Arts, and Sciences, and director of Columbia studios.

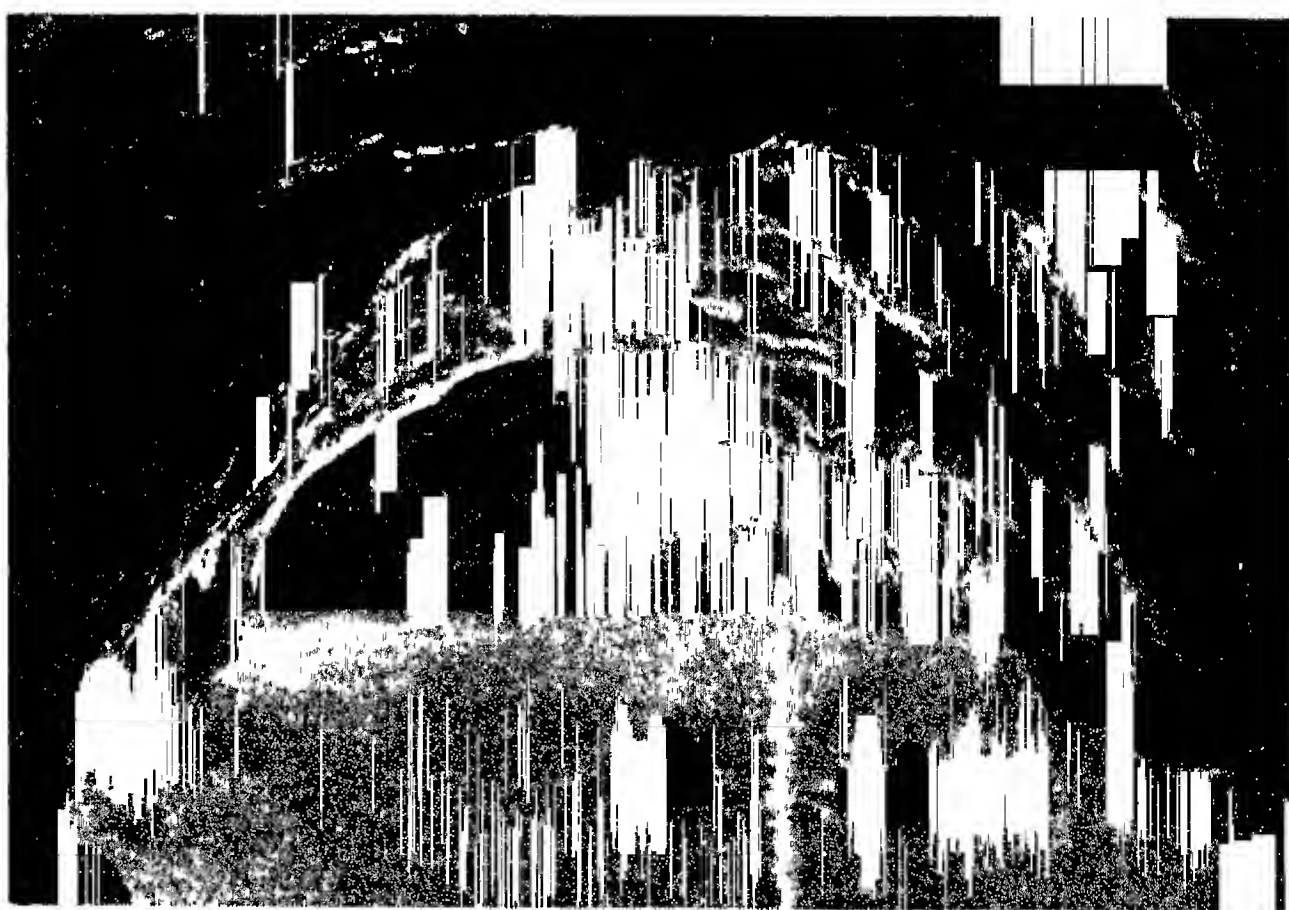
Caprera (Lat. and Ital. *capra*, a goat). Island off N.E. coast of Sardinia. It is connected by cause-

way and drawbridge with the fortified island of Maddalena. It was the home of Garibaldi from 1854 till his death, June 2, 1882. He was buried in his garden, and Caprera was bought by the state.

Capri (anc. *Capreae*). Small island of Italy. Situated at the S. end of the Bay of Naples, 3 m. off the Sorrento peninsula, and 21 m. S. of Naples, it has an area of $5\frac{1}{2}$ sq. m. Wholly mountainous, with cliffs rising to 900 ft., its highest point is Monte Solaro, 1,920 ft. Although it has no streams, and water is scarce, the soil is fertile, producing olives, fruit, and a well-known wine. Fishing is an important occupation, but the chief industry is catering for visitors, of whom in normal times some 35,000 yearly visit Capri. The only safe

Capriccio (Ital., caprice). Musical composition in a free style. In the 17th century the term was applied to pieces in the fugal style though not strictly fugues. Later, movements of the sonata type were thus named when their form was untrammelled. Tchaikovsky's Italian Capriccio for orchestra and Mendelssohn's Rondo Capriccioso for piano are notable. See Sonata.

Capricorn, TROPIC OF. One of the two parallels of latitude on the terrestrial globe, passing through the most N. and S. points on the earth's surface at which the sun can be vertically overhead at noon. The tropic S. of the equator is called the Tropic of Capricorn, because the sun at the summer solstice, when it is vertically over that tropic, enters



Capri. The famous blue grotto; the colour, varying from aquamarine in the water to sapphire on walls and vault, results from the purity of the water within the cave combined with the clarity of the sunlight outside

landing-place, Marina Grande, is on the N. side. A road leads to Capri (alt. 450 ft.), the capital, whence another carriage road ascends to Anacapri; there is also a cable rly. from the marina to Capri. The climate is mild and salubrious, the scenery beautiful. Among the attractions are the famous grottos, or sea-caverns, the best known being the Blue Grotto, a magnificent cavern, 175 ft. long, 98 ft. wide, and 39 ft. high, in which the light appears blue.

Capri was celebrated in Roman times. Augustus and Tiberius resided here; the latter built twelve villas, many ruins of which remain; there are also remains of Roman cisterns and baths. The island was captured by the British in 1806, and in 1808 by the French. Consult *The Story of San Michele*, A. Munthe, 1929.

the astronomical sign of Capricorn. The northern tropic is called the Tropic of Cancer (*q.v.*).

Capricornus (Latin, goat-horned). The Zodiacal constellation next after Sagittarius the archer, also called the Goat-Fish from being represented with the fore part of a goat and the tail of a fish. It is a small constellation and may be found by drawing a straight line from Vega through Altair. The line will pass through Omega Capricorni, one knee of the kneeling goat. See Constellations.

Caprifoliaceae (Latin *caper*, goat; *folium*, leaf). Large family made up of shrubs, small trees, and herbs. Often twiners, they are natives of the temperate and sub-tropical regions of the N. hemisphere. There are 14 genera and about 400 species, including such well-known plants as guelder rose

(*Viburnum*), elder (*Sambucus*), and honeysuckle (*Lonicera*). The small-leaved *Lonicera nitida* has become popular for quick-growing hedges.

Caprimulgidae (Latin *caper*, goat; *mulgere*, to milk). Name given to a family of birds which includes the nightjars or fern owls—misnamed goat-suckers. In shape they resemble the swifts, but have soft mottled plumage like the owls, and wide, gaping mouths. They hunt for insects at night, and nest on the ground. There are about 100 species.

Caprivi de Caprera, GEORG LEO VON, COUNT (1831–99). A German statesman and soldier. Born at Charlottenburg, Feb. 24, 1831, and educated in Berlin, he joined the army in 1849, and in 1883 was made head of the admiralty. In 1890, on Bismarck's resignation, he was appointed chancellor of the empire and president of the Prussian ministry. The aim of Caprivi's foreign policy was a working agreement with Great Britain about the partition of Africa, and he was responsible for important treaties of 1890 and 1893. Commercial agreements with Austria-Hungary, Rumania, Russia, and Belgium in the same year favoured reciprocity in trade. Attacked by the land-owning party for these treaties, and by the militarists for his army reforms, he resigned the presidency of the Prussian ministry in 1892, and was dismissed from the chancellorship in 1894. He died Feb. 6, 1899.

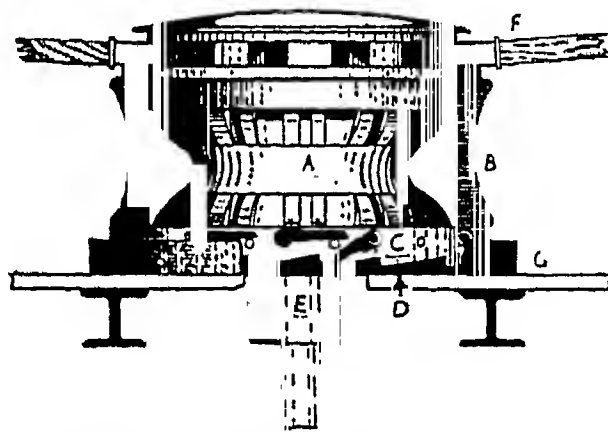
Caprivi Strip. Sliver of the territory of S.W. Africa, extending E. to the Zambezi, between Angola and N. Rhodesia to the N. and Bechuanaland to the S. It was ceded in 1893, when the territory was under German administration, by an Anglo-German agreement and named after the German chancellor Caprivi (*v.s.*). Part of the territory of S.W. Africa mandated to the Union of S. Africa by the League of Nations in 1920, the country proved difficult to control, and on Aug. 1, 1939, the section E. of a line running S. from Beacon 22 and W. of the Kwando river was taken under Union administration.

Caproni. Name of a leading Italian aircraft manufacturing co. which built military machines in the First and Second Great Wars. Its best-known aircraft were the Libeccio, a twin-engined reconnaissance monoplane, and the Ca. 312B. The Libeccio had two 470 h.p. air-cooled radial engines, carried a crew of two, was armed with three machine-guns, and had a top speed of 230 m.p.h. The Ca.

312B was a floatplane which carried either a torpedo or a bomb load of 1,700 lb., with a crew of four. It had two 650 h.p. air-cooled radial engines. The Caproni co., which made the first successful jet-propelled aircraft, was wound up 1950.

Capsicum. A genus of the family Solanaceae, yielding the condiment called pod pepper, red pepper, etc. The fruit is used in sauces and pickles (chillies) or dried and ground (cayenne pepper). The ripe fruit of *C. annuum* has medicinal properties as an aid to digestion and in preventing flatulence. In rheumatism and lumbago capsicum plaster relieves pain when placed over the affected muscles.

Capstan (Lat. *capistrum*, halter). Revolving iron bollard or cylinder, used for manipulating cables aboard ship. A cable is wrapped around the cylinder, which is then turned, so hauling in a cable to lift or weigh an anchor, or to tighten a cable tying up the ship. The cylinder is mounted on a vertical shaft turned from below through a shaft and worm gearing connected to a



Capstan. Capstan for manual or power operation, showing: A, drum or cable holder; B, whelp; C, pawl; D, pawl-rack; E, spinate or shaft to engine; F, capstan bar for manual turning; G, deck

steam engine or other motive power. Formerly capstans were of wood and turned by hand, bars being inserted in holes at the top of the cylinder, the operators pushing the bar as they walked in a circle around the capstan.

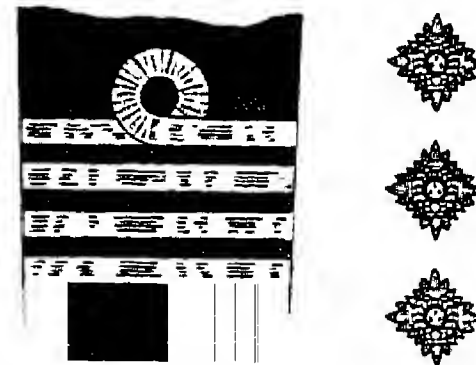
A capstan lathe is a machine in which several tools required for a series of operations are secured in holes in a steel turret. Each tool as it is required can be brought into the working position manually or automatically by turning and securing the cylinder.

Capsule. In botany, a seed case of diverse forms in various kinds of plants. It is sometimes only one-celled (unilocular), but frequently has two (bilocular), three (trilocular), or more cells. The case dries as the seed opens, and sometimes falls off entire, but more usually

splits partially or wholly, discharging the seeds through the openings.

In pharmacy, a capsule is a small gelatine container used for administering a variety of medicaments. It is swallowed whole.

Captain (Lat. *caput*, head). Commissioned rank in the Royal Navy, Royal Marines, and the



Captain. Insignia of rank. Left, navy; right, army

Army. Also a courtesy title given to master mariners and chief pilots of air liners. The leaders of sporting teams, such as cricket elevens or Rugby fifteens, are likewise called captains. Originally, the title of captain was given to the leader of an army, and appears in this sense in Mark 6, when Herod gave a supper to his captains. Hannibal, Gustavus Adolphus, and Cordova were all called captain.

NAVAL. In the Royal Navy a captain ranks immediately above a commander and below a commodore. He usually commands a ship of cruiser rating or above, or a squadron of destroyers or smaller vessels. When he commands an admiral's ship he is called a flag-captain. There are, of course, captains in other branches, e.g. engineering and supply. A captain wears four gold stripes and a loop on his sleeve or shoulder strap, and a line of gold braid on the peak of his cap. His rank is equivalent to that of a colonel in the army.

Captain of the fleet is the title borne by the captain (sometimes given the rank of commodore second class) on the staff of a commander-in-chief, who is responsible for personnel and supplies.

ARMY. In the British army a captain ranks below a major and above a lieutenant. An infantry captain generally commands a company, although this is not a hard and fast rule. A troop of artillery and a squadron of armoured vehicles are normally commanded by captains. A captain's rank is denoted by three stars on the shoulder strap. An army captain is equivalent in rank to a lieutenant in the Royal Navy. The equivalent rank in the Royal Air Force is flight lieutenant; a group captain in the R.A.F.

corresponds to a captain in the navy and an army colonel.

MERCHANT NAVY. In the merchant navy this title is given by custom to every seaman who commands a vessel, from one in charge of an Atlantic liner to one controlling a small coaster. In legal language, the captain is the shipmaster, or master, and as such he has grave responsibilities towards owners, passengers, and crew. On all vessels, except small coasters, he must sign an agreement with each member of the crew, defining pay, privileges, and duties, and is also responsible for the safety of the ship and cargo. Formerly the courts held that he could flog and put irons upon a disobedient seaman. Nowadays his authority is supported by the jurisdiction of civil courts ashore.

In passenger ships the master must, before sailing, give the authorities a list of those on board. A captain is permitted to read the services of the Church, but the courts declared that a marriage celebrated by one of them was not legally valid.

In the U.S.A. a captain may be an officer of police or a member of a state governor's semi-military staff who accompany him as escort on formal occasions.

Captain. A British ironclad of 6,900 tons. Designed by Captain Cowper Coles, she was built by Messrs. Laird at Birkenhead, and completed in 1870, and lost in the Bay of Biscay on Sept. 7 of that year. She was built rather to quieten popular clamour than with the full approval of the Admiralty, who did not believe in the combination of masts and yards, a low freeboard, and high turrets, which she embodied. She capsized in a gale and went down with Captain Coles himself on board, Capt. H. T. Burgoyne, V.C., in command, and 473 other officers and men.

Captain, THE. British monthly periodical for boys. First published at sixpence, April, 1899, by George Newnes, Ltd., it had an unbroken run until 1922. R. S. Warren Bell was editor, under the pen-name of The Old Fag, until 1910, being succeeded by Reeves Shaw. C. B. Fry acted as athletic editor 1899-1905. P. G. Wodehouse was for many years a regular contributor of public school stories, including seven long ones in serial form, originating a new and livelier style for that type of work.

Captain Brassbound's Conversion. Comedy in three acts by G. Bernard Shaw, produced at the Strand Theatre, London, Dec. 16, 1900, with Janet Achurch as Lady Cicely Waynflete, Laurence Irving as Captain Brassbound, and Granville Barker as Captain Kearney. The part of the heroine was originally written for Ellen Terry, who played it in later productions.

Caption (Lat. *capere*, to take). Term used in old English law. It means the formal part of an indictment, showing the authority under which it is executed, or else of the legal record of evidence. This is not necessarily at the head of the document. In the printing trade a caption, originally the technical term for the heading page or chapter of a book, is now used for the matter printed beneath a pictorial illustration, properly known as a cut-line or legend. This misuse led to the adoption of the term by film producers for any explanatory wording that may accompany a film on the screen.

Capua. Fortified city of Italy, in the prov. of Caserta, 2½ m. from the site of ancient Capua. It is on the river Volturno, 27 m. N. of Naples. The see of an archbishop, it had a cathedral from the 11th century. Founded c. 600 B.C. by the Etruscans, Capua was next in wealth to Rome and Carthage, and

was celebrated for its purple stuffs, scarlet dyes, and fine linen, and the corn, wine, and horses of the surrounding plain. But luxury led to effeminacy and degeneracy, and the city, founded by the Etruscans and allied with Rome 343 B.C., was conquered, after its alliance with Hannibal, by the Romans in 211 B.C. Restored by Caesar and his successors, Capua regained its former prosperity, but was devastated by Goths, Vandals, and Saracens, by whom it was finally destroyed in A.D. 840. There are many remains of antiquity, the chief being those of the amphitheatre, estimated to hold over 60,000 people, and baths. Capua fell to the Allied 5th army engaged against the Germans in Italy on Oct. 7, 1953. Its cathedral was seriously damaged in the fighting. Pop. (1951) 16,234.

Capuana, Luigi (1839-1915). Italian author. Born at Mineo, in Catania, May 27, 1839, he became known as poet, playwright, novelist, and critic. His best work includes the realistic novel *Giacinta*, 1879; a book of fairy tales, 1882, translated into English as *Once Upon a Time Fairy Tales*, 1892; and *Il Marchese di Roccaverdina*, 1901. He died Nov. 28, 1915.

Capuchin Monkey (*Cebus capucinus*). Group of American monkeys known as the Sapajous.

The term is applied more especially to the Weeper Sapajou of Brazil. The general colour of its fur is golden brown, paling to yellow on the cheeks, throat, and chest; and the hair on the crown of the head has the appearance of being well brushed back. Its supposed resemblance to a monk's hood accounts for the popular name of the animal. Capuchin monkeys live in the tree-tops and only come down to drink. They are usually found in small herds under the leadership of an old male, and feed upon fruits and insects. Because of their gentle disposition and intelligence they make attractive pets.

Capuchins (Late Lat. *caputium*, hood). Independent branch of the Franciscan order of friars. Founded in the Marches of Italy in the 16th century by Matteo di



Capuchin Monkey.
Cebus capucinus



Capua. Ruins of the ancient amphitheatre, built to hold 60,000 spectators

Bassi, who aimed at restoring the primitive and stricter observance of the rule of S. Francis, and at reviving the earlier spirit of the Friars Minor, the order spread quickly. The Capuchin Friars, who occupy themselves mainly with mission work, have their houses throughout the world. *See* Franciscans; Friar.

Capulet. Anglicised form of the name of one of the rival families of Verona (Cappelletti) whose quarrels form the story on which Shakespeare founded his *Romeo and Juliet*. In the play the family is represented by Capulet, the head of the house, Lady Capulet, their daughter Juliet, their nephew Tybalt, and servants and kinsfolk.

Capus, ALFRED (1858-1922). French author. Born at Aix-en-Provence and trained as an engineer, he made a reputation as a journalist on *Le Figaro* by his wit and keenness of observation. His plays include *Brignol et sa Fille*, 1895; *La Veine*, 1901; and *Monsieur Piégois*, 1905; and his novels *Monsieur Veut Rire*, 1893; *Faux Départ*, 1891; *Années d'Aventures*, 1895. He was elected in 1914 a member of the French Academy. He died Nov. 1, 1922.

Caput Succedaneum. Tumour containing blood and serum which forms during the process of birth on the part of the scalp or face not subjected to the pressure which is exerted on the rest of the body. It disappears usually in from 24 to 48 hours after birth. When seen on a newly-born infant, this entirely natural effect is sometimes mistaken for the results of violence.

Capuzzo, FORT. Italian stronghold of the Second Great War. It is S. of Bardia, on the Egyptian frontier. Bombarded by British battleships on Aug. 17, 1940, the fort was captured by British Imperial troops on Dec. 17, during the first desert offensive of the war. The German Afrika Korps occupied it in April, 1941, when the British were driven back to Sollum. It was regained by the British, but not held, in June. Recaptured Nov. 21 by the British 8th army under Gen. Cunningham it again fell June 24, 1942. After the breakthrough at Alamein, it was retaken by the 8th army under Gen. Montgomery Nov. 12. *See* North Africa Campaigns.

Capybara (*Hydrochoerus capybara*). Spanish name for the Carpincho, the largest member of the rodent order of mammals. It is about 4 ft. long and attains a weight of about 100 lb. Its hair is coarse and reddish brown. It is found only in S. America, where it lives on the banks of the rivers and lakes. Carpinchos are usually seen in herds of twenty or more. They feed mainly on water plants, but in the neighbourhood of cultivated lands do great damage by devouring the crops by night. They are hunted for their skins and S. Americans eat the flesh.

Caquetá. River of S. America, the upper course of the Yapurá.

Caquetá. Division of Colombia. It is one of the five intendencies and has an area of 39,777 sq. m. It is well wooded, and peopled by Indians. Florencia is the chief settlement. Pop. (est.) 21,140.

Carabinieri. Word used in Italy for the gendarmes or police. The royal regiment of Carabinieri is a kind of military police, partly mounted, partly on foot. Formed in 1814, they were very useful in

third. In England the first regiment of carabinieri was raised in 1692; the regiment was then known as the

Dragoons, but in the 18th century became the 3rd Carabinieri.

In 1922 the 3rd Carabinieri and the 6th Dragoon Guards were amalgamated as the 3/6th Carabinieri. The regiment is now mechanised and as part of the Royal Armoured Corps

saw service in Africa, Europe, and in Burma in the Second Great War. The Belgian army has an infantry regiment called Carabinieri. *See* Dragoon.

Carabobo. Maritime state of Venezuela. It has an area of about 2,950 sq. m. The fertile region round Lake Valencia produces cocoa, coffee, sugar, cotton, grain, dye-woods, and rubber; cattle are reared, and hides exported. Valencia is the capital, and Puerto Cabello the chief port. In Carabobo a revolutionary force under Bolívar, with a British legion taking part, defeated the Spaniards June 24, 1821. Pop. (1950) 243,159.

Caracal (*Felis caracal*). Rare wild cat, related to the lynx group. Found in Africa and S. Asia, it is reddish brown in colour, with ears tufted like those of the lynx, but with a longer tail and no ruff round the neck. It is believed to prey upon gazelles and birds, but is easily tamed. The name is a French corruption of Turkish *qara qulaq*, black ear.

Caracal. Town of Rumania, capital of a district of the same name. Named after the Roman emperor Caracalla, it is 95 m. W. by S. of Bukarest, on the Rimnik-Corabia rly. It is an ancient town, and carries on a trade in grain. Pop. (est.) 15,000.

Caracalla (A.D. 188-217). Roman emperor, 211-217. Son of Septimius Severus, his original name was Bassianus, afterwards changed to Marcus Aurelius Antoninus. He was nicknamed Caracalla from his long Gallic cloak of that name, resembling a frock coat. His vicious propensities and constant quarrels with his brother Geta induced the father to take his two sons with him to Britain on a punitive expedition against the tribes in the north of the island. After the sudden death at Eboracum (York) of Severus, Caracalla, who was suspected of



Capybara or Carpincho, the largest member of the rodent mammals



Carabinieri. Italian mounted military police

clearing Sicily of brigands. They fought in the First Great War.

Carabinieri OR CARABINEERS. Regiments of cavalry armed with a short firearm called the carbine (*q.v.*). The most famous corps of carabinieri was that formed in the French army by Louis XIV. In the 17th century the seniority of cavalry regiments was governed by their weapons; cuirassiers first, carabinieri second, and dragoons

having poisoned him, was proclaimed by the soldiery joint emperor with Geta. Apparently reconciled, he and his brother returned to Rome; but in the year after their accession Caracalla slew Geta. A reign of terror followed, in which about 20,000 of Geta's adherents, including the jurist Papinian, were put to death.

Caracalla spent the later years of his reign travelling in Gaul, Germany, Dacia, Thrace, Syria, and Egypt; from a pretended military success against the Alemanni, who then, for the first time, came into collision with Rome, he took the name of Alemannicus.

Caracalla was murdered near Edessa at the instigation of the praetorian prefect Macrinus, who succeeded him. The tyrannical reign of Caracalla was marked by the extension of Roman citizenship to all freeborn subjects by an edict in 212.

Caracara (*Polyborus tharus*). South American "carion hawk," 20 to 24 ins. long, dull black, with



Caracara,
S. American hawk

whitish neck, back, breast, and tail, and bare red skin on the cheeks and throat. It has long legs and can walk or run with ease. The flight is powerful and graceful, and it can fly very high. It feeds mainly on carrion, supplemented with young lambs, birds, reptiles, frogs, worms, and insects. It makes large shallow nests either in trees or on the ground, and lays three or four eggs. Another very similar species, *P. cheriway*, occurs as far north as Florida and Lower California.

Caracas. Capital of Venezuela, and of its federal district. The highest part of the city is more than 3,000 ft. a.s.l. It is 11 m. by road, 23 m. by rly., S. of La Guaira, its port on the Caribbean. The birthplace of Simon Bolívar, liberator of Spanish S. America, Caracas is built round the Plaza Bolívar, in which stands his statue. It has streets at right angles and broad, shady avenues and squares. Founded 1560-67, it has a cathe-



Caracalla,
Roman Emperor

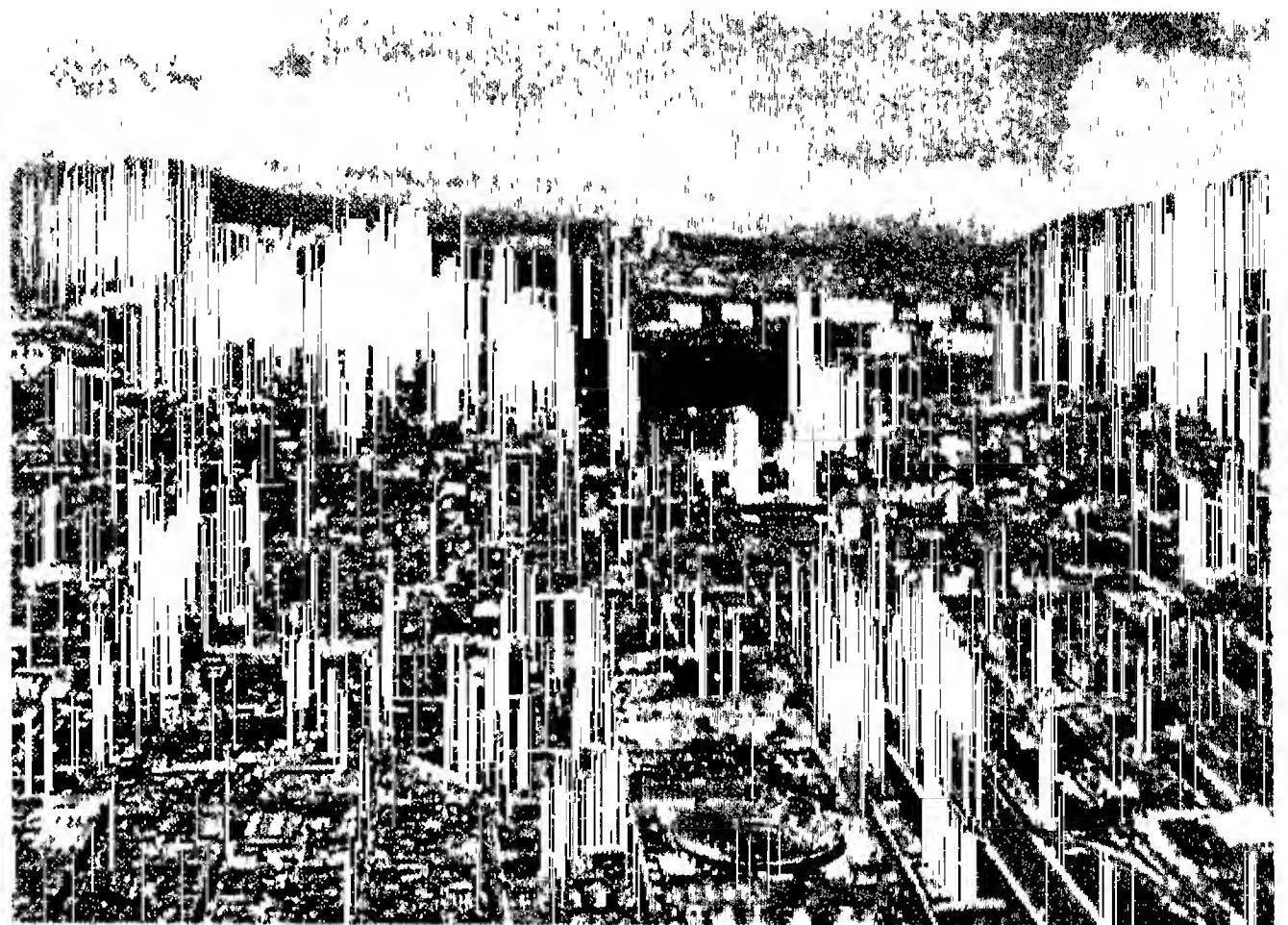
dral, government palaces, university, museum, municipal and national theatres, and the house of Bolívar with mementoes of the hero. The 20th-century Avenida Bolívar through the centre of the town has three levels—for local traffic, parking, and through traffic.

Although Caracas is in the tropics, its temperature varies only between 62° and 82° F. The chief industries are brewing, cement, paper, textile, and tobacco making, and tanning. Products include cacao, coffee, and sugar.

A rly. line having 86 tunnels and 217 bridges connects it with Santa Lucia and Valentia; air services

Palermo in 1798, though disapproving of his action Caracciolo accompanied him, but resigned in Jan., 1799, and returned to Naples. There he was persuaded to accept command of the navy of the new Parthenopean republic, thus coming into conflict with the British.

When the republic was overthrown by the British fleet and Cardinal Ruffo's royalist army, Caracciolo was betrayed, June 29, 1799, and taken on board Nelson's flagship. Sir William Hamilton having intimated to Nelson that the queen of Naples desired the execution of Caracciolo, within 24 hours he was tried aboard Nelson's ship for high treason by a court martial of royalist Neapolitan officers, allowed no witnesses for the defence, and was hanged at the yard-arm of the British ship Minerva.



Caracas. Air view of the capital of Venezuela, showing 20th-century development of this 16th-century city

and a good road link it with Lima. Pop. (1950) 495,064.

Caracus has suffered from several earthquakes, e.g. in 1812. It played a leading part, under Miranda and Bolívar, in the early S. American revolutions, declaring independence in 1811, and becoming the capital of a separate Venezuelan republic in 1829.

Caracciolo, DUKE FRANCESCO (1752-99). Neapolitan admiral, executed by Nelson. Caracciolo was born in Naples into one of the oldest Italian noble families, Jan. 18, 1752, and entered the navy. He served with distinction on British vessels during the War of American Independence and elsewhere, and later became admiral to Ferdinand IV of Naples. When the king fled with his court to

Caracoles. Small town of Chile, in Antofagasta prov. It stands 9,400 ft. above sea level, 75 m. N.E. of Antofagasta. The rich silver and copper deposits found here in 1870 are almost exhausted.

Caractacus (c. A.D. 51). British king. He was a son of Cunobelin, Shakespeare's Cymbeline. After being defeated by the Romans in 51, perhaps near Shrewsbury, and sent in chains to Rome, where he figured in a procession before the emperor Claudius, he stated his case so well that the emperor pardoned him. The name Caractacus, more correctly Caratacus, is the Latinised form of the Celtic Caradoc, which occurs in Welsh place-names and was the name of one of the Knights of the Round Table in Arthurian legend.

